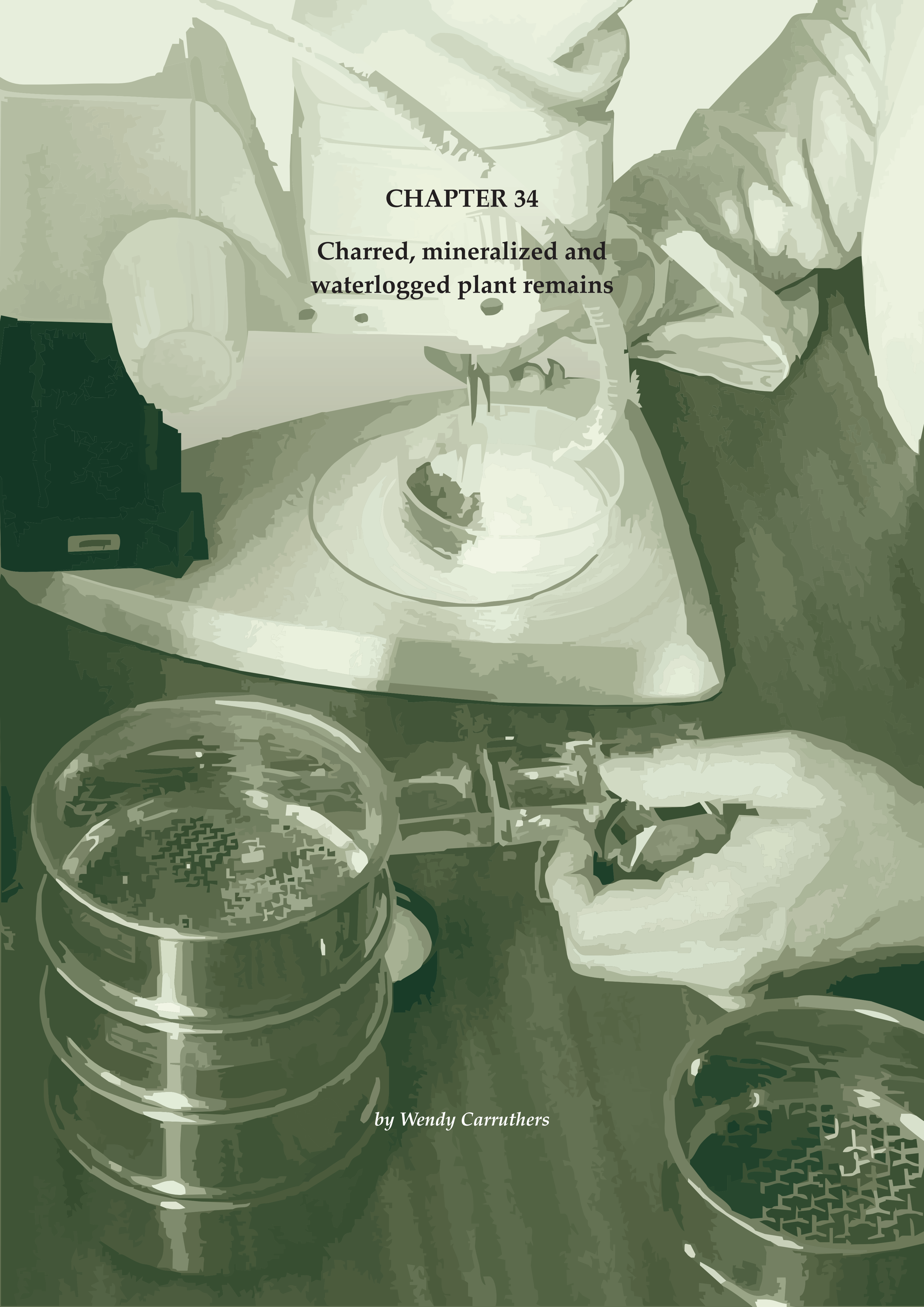

CHAPTER 34

Charred, mineralized and waterlogged plant remains

by Wendy Carruthers

34 Charred, mineralized and waterlogged plant remains

Wendy Carruthers

Excavations were carried out at Stansted Airport by Framework Archaeology during 2000 to 2001 in advance of the expansion of car parking facilities. An intensive program of soil sampling for the recovery of environmental remains was undertaken under the direction of Dana Challinor (OA Environmental Coordinator). Deposits dating from the Neolithic to post-medieval periods were sampled, including hearths, pits, ditches, postholes and occupation layers. Sample sizes varied, but were generally 1 litre for waterlogged deposits and around 40 litres for charred plant remains (see the bottom of Tables 34.1-6 for sample sizes).

The soil samples were processed using standard methods of wet-sieving and floatation by OA staff. During 2002 to 2004 charred and waterlogged flots and some residues were assessed by Ruth Pelling, Gaylynne Carter and the author. A total of 516 samples were assessed out of 797 samples taken from the five sites at Stansted. This report discusses the full analysis of 38 charred samples, 2 mineralised samples and 6 waterlogged samples highlighted as containing well-preserved and informative plant assemblages in the assessment reports. The samples originated from Neolithic to post-medieval contexts from the MTCP (BAAMP00), M11 (BAALR00), LTCP (BAACP00), LBR (LBR) and LTCP (BAACP01) sites. Most of the productive samples were dated to the Late Iron Age/early Romano-British and mid to late Romano-British periods.

Twenty-two additional charred flots were assessed from Stansted Southgate (BAA SG 03) during 2003, from which eight were selected for further analysis. These dated from the Early Neolithic to Late Saxon periods. The results from the Southgate analysis are discussed in a separate report (see below), but used for comparative purposes in this report.

Results

Tables 34.1 to 34.6 present the results of the analysis. Nomenclature and most of the habitat information was taken from Stace (1997). Other texts consulted for details of habitat and plant ecology include Haslam *et al.* (1976), Hill *et al.* (1999) and Ellenberg (1988).

Quantification – Many of the mid to late Romano-British samples contained concentrated spelt processing waste, comprising vast numbers of charred plant remains. It is often impossible to make meaningful counts of the spelt grains and spelt chaff in these types of deposits, so an indication of their abundance was given instead (>500). Since the character of these deposits is clear without having to examine proportions of spelt grain to chaff etc., it was thought to be more useful to examine the minor components in detail, such as non-spelt cereal remains and weed seeds, as this information could be used to compare samples from different sites. Therefore, in most cases (except sample 6117 = 50% analysed) full flots rather than sub-samples were scanned for 'non-spelt' charred plant remains.

An estimate of abundance was used for a couple of taxa in the waterlogged samples whose seeds were present in numbers too large to be counted (aquatic buttercups (*Ranunculus* subg. *Batrachium*) and stinging nettle (*Urtica dioica*). However, sub-sampling was undertaken for most of the waterlogged flots, since it was possible to obtain a good understanding of the character of these diverse assemblages by examining small fractions of the flots. Waterlogged flots are very time-consuming to sort, so sub-sampling is usually the most cost-effective way to retrieve the maximum amount of information from waterlogged deposits.

The quantification of mineralised faecal deposits presents yet another problem, as mineralised remains such as bran fragments and legume (pea and bean) testa (seed coat) fragments can be too numerous to count. They are also often concealed within faecal concretions. Since it would be difficult to convert these remains back into 'slices of bread' or whole peas, and preservation conditions can greatly influence the quantities recovered, it is often only worthwhile making general qualitative and comparative comments about these types of assemblages.

Discussion

Considering the large number of samples taken from the Stansted sites, relatively few produced useful plant assemblages. The c. 8% of charred samples that were productive was dominated by samples from Late Iron Age/early Romano-British and mid to late Romano-British. Fortunately, the excavation of waterlogged Bronze Age features (barrow ditch 324080 and waterhole 430084) and a mineralised early medieval cess pit (310136) increased the range of information obtained for these periods.

The Stansted plant remains have been discussed period by period below, in order to try to track changes in the landscape, agricultural practices and diet through time. Because the evidence from this study is sparse for some periods but a relatively large number of other excavations have taken place nearby (in particular, Murphy and Wiltshire 2004), information from published reports has been brought in to assist in the interpretation. Evidence from other environmental specialist reports has also been included (see reports by Gale, CD Section 35; Huckerby *et al*. CD Section 31; Macphail and Crowther, CD Section 30; Robinson, CD Section 36).

The Neolithic

Very little environmental evidence was recovered from the few features dated to this period, but the small scatterings of flintwork suggest that the environment was likely to have been largely wooded with a few small clearings (Nick Cook and Fraser Brown, pers. comm.).

A single sample from the lower fill of pit 353011 (sample <2670>, context 353012) produced poorly preserved, abraded charred plant remains comprising a bread-type wheat grain (*Triticum aestivum*-type), two unidentifiable cereals and a hundred and three small eroded fragments of hazelnut shell (*Corylus avellana*). This context, containing a typical

Neolithic flint assemblage, is said to be a placed deposit of possible ritual significance (Nick Cook, pers. comm.). The charred plant remains, however, appear to be too poorly preserved to have been deposited immediately after charring. Perhaps they had been exposed to the elements prior to burial.

Small quantities of cereal grains and frequent hazelnut shell fragments are typical of Neolithic sites in England (Mofftett *et al.* 1989). The general scarcity of cereals and cereal processing waste during this early stage in the development of agriculture, and frequency of evidence for gathered wild foods such as hazelnuts, apples and tubers suggests that arable cultivation was being carried out on a small scale in most cases. However, larger quantities of cereal remains were recovered from The Stumble in the Blackwater estuary (Murphy 1989), indicating that river valleys and coastal plains may have been favoured for arable cultivation. No charred plant evidence was recovered from Neolithic deposits from the A120 sites (Carruthers 2007), and some Early Neolithic charred plant remains from a treethrow at Stansted Southgate are suspect, as a Late Saxon date was recovered from flax seeds in this feature.

Although the evidence is scant, it is interesting to note that the one identifiable cereal grain was a bread-type wheat (*Triticum aestivum*-type) grain. Bread-type wheat has been recovered from several early prehistoric sites in small quantities, often alongside emmer wheat and barley. However, despite its apparent advantage of being free-threshing, ie being easily removed from the husk once ripe, it is not recovered in large quantities until the Roman period. There maybe some significance in its appearance in a ‘ritual’ deposit, as it has been found in similar Neolithic and Bronze Age contexts on other British sites (eg Le Pinacle, Jersey; Carruthers 2001; Amesbury, Carruthers forthcoming).

<u>Middle Bronze Age</u>

Two charred and four waterlogged samples were examined from this period as follows:

BAAMP00 -	<2241> context 322018, MBA pit 322014: charred
	<2684>, <2685> and <2687>, BA ring ditch 324078: waterlogged
BAALR00 -	<6140> context 423050, MBA pit 423049: charred (3.6 fpl)
	<6223>, context 431042, LBA waterhole 430084: waterlogged

The samples from the two MBA pits produced low concentrations. Sample <2241>, from a charcoal-rich upper fill of pit 322014, comprised mainly emmer (*Triticum dicoccum*) and spelt (*T. spelta*) chaff fragments (both species were identified), with a few poorly preserved grains and common disturbed/cultivated ground weed seeds (ratio of grain to chaff to weed seeds (G:Ch:W) = 3:9:1). This probably represents a small deposit of cereal processing waste - perhaps sweepings from a domestic hearth over which the final stages of processing (removal of grain from the husks) had taken place.

Sample <6140>, from a deliberate backfill in the base of pit 423049, was richer in cereal grains than chaff and weed seeds (G:Ch:W = 6:2:3). Because chaff is more readily destroyed by charring than grain (Boardman and Jones 1990) this could have originally been a deposit of whole unprocessed spikelets that had been burnt and placed in the base of the pit. Several poorly preserved 'slaggy-looking' cereal fragments were present in this sample suggesting that the temperature of combustion had been high, so differential preservation may well have occurred. Alternately, a mixture of processed grain and cereal processing waste may have been deposited. Once again, both emmer and spelt wheat were identified. Barley (*Hordeum* sp.) and possible oat (cf. *Avena* sp.) were present as single grains, although the state of preservation was poor. Several weed taxa were represented in this assemblage, most of which were tall and often twining/climbing weeds of cultivated and disturbed soils, eg black bindweed (*Fallopia convolvulus*), vetches/tares (*Vicia/Lathyrus* sp.) and cleavers (*Galium aparine*). This could be because unprocessed sheaves had been burnt, including the twining stems and fruits of weeds that were growing amongst the crop. The seeds of cleavers were particularly frequent (27 nutlets). This weed is said to be an indicator of autumn sowing (Reynolds 1981), so its frequency could relate to the introduction of spelt wheat into Britain around the MBA, which is hardier than emmer and better suited to autumn sowing.

These two samples were very similar to the small number of Bronze Age samples from the A120 excavations that produced low concentrations of cereal remains (Carruthers 2007). Evidence for the cultivation of emmer, spelt, and barley was recovered from both excavations, with small quantities of hazelnut shell indicating that gathered wild foods were still important. Because only low concentrations of remains were recovered from just a few samples, very little reliable information about crop husbandry can be extracted from the data. Weed assemblages were often fairly limited and unspecialised during this period, probably because cultivation was taking place at a low intensity on newly ploughed soils that had not had time to develop a specialized arable weed flora. A small difference between Stansted and the A120 was that a sedge nutlet and several leguminous weed seeds were recovered from Stansted but not the A120 sites. The single sedge nutlet is of minor significance, indicating the cultivation of a wet area of the boulder clay plateau. The presence of several small seeds from leguminous weeds in M11 sample, however, could suggest that cultivation had taken place for a longer period on this site or on a larger scale, since these weeds are more common on impoverished soils. Clearly, more evidence is needed to follow up this tentative suggestion.

The waterlogged samples from the BA ring ditch 324078 and LBA waterhole 430084 provided valuable evidence of the local environment, as well as conditions within the features themselves. Ring ditch 324078 encircled the remains of a round barrow, but there was no evidence of pyres within the barrow (see Chapter 4). The three samples were taken from a single section through the ditch representing the earliest stages of silting up (2687 below 2685 and 2684, respectively). Although all three samples produced a similar range of aquatic, marginal and terrestrial taxa, the lowest fill (context 316120) produce the lowest concentration of plant remains. This may have been because it was derived from the initial silting, before a diverse ditch flora had become established, or grazing could have prevented the local plants from setting seed. Macphail and Crowther (CD Section 30) note that there was a possible dung element in the ditch soil profile. The second fill, <2685> (context 316123) contained the highest concentration of plant remains, with aquatic and marginal taxa such as crowfoot (*Ranunculus* subg.

Batrachium), water plantain (*Alisma plantago-aquatica*) and duckweed (*Lemna* sp.) being particularly abundant. Water plantain is often found in nutrient-rich waters and it is notable that disturbed ground plants such as nettles (*Urtica dioica*) and docks (*Rumex* sp.) were also frequent in this sample. This level in the sedimentation of the ditch, therefore, appears to represent a period of disturbance around the ditch, but not so much as to prevent a diverse aquatic and marginal flora from becoming established in the ditch itself.

The examination of a sample from another section of the ring ditch for insects (Robinson, CD Section 36) showed that the ditch was set in an open, grazed grassland environment, with only 1% of the terrestrial Coleoptera being associated with wood. Dung beetles were fairly frequent, demonstrating that livestock were grazing the area. This may account for nutrient enrichment of the ditch and the establishment of areas of nettles and docks. However, Robinson noted that insects associated with arable and disturbed land were not frequent, so this may be a fairly localised vegetation type. He also suggested that human habitation did not occur nearby.

Open grassland plant taxa were not frequent in the plant assemblages, but this is not surprising if the sward was too heavily grazed for many of the plants to set seed. Thistle achenes (*Cirsium/Carduus* sp.) were present in small numbers in all three ditch samples, and this type of unpalatable weed can become abundant on well-grazed pastures. The presence of open ground plants such as ribwort plantain (*Plantago lanceolata*) was confirmed by the insect record, but seeds were not recovered. Plants whose presence was confirmed by both plant remains and insect feeders, however, included duckweed, sedges, buttercups and stinging nettle. These taxa are less palatable to grazing livestock than grasses, so will only be eaten where very little grass is available.

Although the evidence for wood was low amongst the insect and pollen remains, a few hedgerow, scrub or woodland plant remains were present in the ditch at all three levels. The earliest deposit produced an alder seed (*Alnus glutinosa*) and possible sloe stone fragment (*Prunus* sp.). Unless carried by humans or animals, these remains are unlikely to travel far from their parent trees. There may have been small areas of alder woodland or hedgerows nearby, or the seeds may have been brought in on feet and in dung. The two upper levels contained bramble seeds, Rosaceae thorns (rose/bramble and hawthorn/sloe), a possible maple seed fragment and elderberry seeds. Some of these are from edible fruits, but the thorns obviously represent woody material that had fallen into the ditch or been brought onto the site. This could indicate that scrub was becoming established around the site by the time <2685> was being deposited. Huckerby *et al.* (CD Section 31) noted that the pollen evidence indicated some evidence of scrub/woodland re-growth. Alternatively, some of the material could have been brought onto the site for leaf fodder as cut branches.

More substantial evidence for the existence of woodland, scrub or hedgerows was recovered from the MBA waterhole 430084 on site BAALR00. In addition to a similar range of scrubby taxa as the ring ditch, four woody taxa and several herbs characteristic of shaded places were recorded. The woody taxa comprise hawthorn (*Crataegus monogyna*), rose (*Rosa* sp.), dogwood (*Cornus sanguinea*) and alder buckthorn

(*Frangula alnus*). It may be significant that none of these are large trees, and all can be found in hedgerows or scrub. The woodland/hedgerow herbs include three-nerved sandwort (*Moehringia trinervia*), garlic mustard (*Alliaria petiolata*) and possible lords and ladies (cf. *Arum maculatum*). Leaf fragments, twigs, wood fragments and moss were frequent in this sample (unlike the ring ditch samples which only contained a few small fragments of wood) providing further evidence that the trees/shrubs were growing close to the waterhole. In addition, the insect assemblage contained a strong woodland/scrub component (Robinson, CD Section 36). Robinson has suggested that this could represent rapid post-abandonment re-growth of woody vegetation. However, it is notable that almost all of the MBA and LBA waterholes examined at Heathrow (Carruthers 2006; Framework Archaeology in preparation) produced very similar ranges of fruits, leaves and thorns from hedgerow/scrub/woodland taxa, and these assemblages were in samples taken from both primary and secondary fills. It is likely, therefore, that waterholes were located close to hedgerows, perhaps in the corners of hedged fields, or even in woodland clearings.

Numerically, the dominant taxon in this sample was stinging nettle seeds, which were too numerous to count. The very high frequency of seeds suggests that this plant was probably growing around the waterhole. Other weeds of nutrient-enriched, disturbed soils such a dock and common chickweed were also frequent. Since the sample came from a 'deliberate backfill' in one side of the waterhole, the assemblage may have contained dumped material in addition to evidence of the surrounding vegetation. A small quantity of domestic waste, including a probable emmer/spelt glume base and a few small fragments of cultivated flax (*Linum usitatissimum*) capsule, was present. A similar range of aquatic taxa to the ring ditch was present, but marginals such as mint (*Mentha* sp.), gypsywort (*Lycopus europaeus*) and sedges (*Carex* sp.) were absent or scarce. It is likely that the water was fairly eutrophic, due to the deposition of waste in the feature. Daphnia egg cases (Cladoceran ephyppia) and fruits of water starwort (*Callitriche* sp.) are characteristic of this type of habitat, and both taxa were common in this sample. The remaining few taxa were common grassland weeds, such as buttercups (*Ranunculus acris/repens/bulbosus*), ribwort plantain (*Plantago lanceolata*) and grasses (various Poaceae). To summarise, therefore, the suggested vegetation in and around the waterhole was probably grassland with scrub or hedgerows very close-by, or with woody taxa becoming re-established soon after abandonment. Areas of nettles and other disturbed ground plants were dominant around the feature. A well-developed aquatic flora was growing in the waterhole, reflecting the nutrient-enriched status of the water, but the margins were probably too disturbed by trampling for marginal plants to survive.

Iron Age to early Romano-British

The settlement pattern up to the MIA appears to have remained fairly unchanged, consisting of small, scattered un-enclosed settlements. By the LIA/ERB period enclosure and more intensive settlement, including settlement of the clay plateau, created a patchwork of large fields linked by droveways. Quern stones and animal bones were much more frequent (Nick Cook and Fraser Brown, pers. comm.). Since very few EIA and MIA samples were available for study, this change is difficult to detect using the charred plant remains evidence. Only one sample was fully analysed from the EIA (pit 436091), and this produced a low concentration (1 fpl) of emmer/spelt wheat and barley grains with some chaff, common weed seeds (blinks and cleavers) and hazelnut shell that was similar in nature to earlier assemblages. This probably represents low-level mixed domestic waste. Of course, the scarcity of features and charred waste from this period is, in itself, evidence that the level of agricultural activity in the area was low during the EIA to MIA.

The LIA to ERB samples mainly came from the two sites along the western side of the Stansted excavation area; BAALR00 and BAACP00, although an ERB pit was located at BAAMP00 in the east. A number of particular characteristics can be seen in the LIA to ERB samples, so they have been discussed as a group below. Because so many of the LIA and RB samples produced useful quantities of charred plant remains, it is useful to compare samples from the earlier and later Roman periods to look for changes in crop husbandry practices. This is done in the section below.

EIA	BAALR00 -	<6211>, context 436092, pit 436091 (1 fpl)
LIA	BAALR00	<6131>, context 439014, ditch 439013 (52.4 fpl)
LIA/ERB	BAACP00 -	<476>, context 107067, ditch 109169 (13.5 fpl)
LIA/ERB	BAALR00	<6117>, context 430019, ring gully 430039 (52.5 fpl)
ERB	BAACP00	<297>, context 138015, ditch 109212 (5.3 fpl)
ERB	BAACP00	<324>, context 150003, ditch 102071 (17.7 fpl)
ERB	BAACP00	<371>, context 136013, pit 136045 (12.9 fpl)
ERB	BAAMP00	<2516> context 330146 – pit 330145 (67 fpl)

As can be seen from the charred fragment concentrations given above (fpl = fragments per litre of soil processed), much higher concentrations of charred cereal remains were recovered from most of the Late Iron Age and early Roman samples than from earlier periods.

The LIA to ERB samples from all three sites produced predominantly grain-rich or grain- and chaff-rich samples, rather than cereal processing waste (chaff and weed-rich). Grain-rich assemblages are likely to have originated as processed grain that has been accidentally burnt during the preparation of food, or, if larger quantities are present, the parching of processed grain prior to storage, grinding or during the production of malt. In addition, spoilt grain, including the waste from cleaning out storage pits (Reynolds, 1976), may have been deliberately burnt in order to destroy pests and diseases.

Grain- and chaff-rich assemblages may have been derived from;

- whole ears of wheat
- burnt spikelets, ie semi-processed grain still in the husk. It is thought that hulled wheats would have been stored in this form in regions with damp climates (Hillman 1981).

In some cases where chaff fragments were common but not as frequent as grains, whole spikelets or ears may have been present, but differential preservation brought about by charring may have reduced the proportion of chaff (Boardman and Jones 1990).

Spikelets or whole ears are most likely to have become charred during parching – a stage in the processing that makes the removal of chaff easier. Accidental fires and the destruction of infected spikelets could also produce this type of assemblage. The presence of concentrations of material of this type in a number of pits and ditches suggests that cereal processing was occurring on a much larger scale than in previous periods. Although corn driers were not found amongst the LIA/ERB features, they were probably being used to parch large quantities of wheat and barley at a time, rather than the small scale piecemeal parching over domestic hearths that took place in earlier periods. A late Roman corndrier was excavated at BAAMP00 (see below).

Notable characteristics of the LIA/ERB assemblages were as follows:

- None of the assemblages were rich in cereal processing waste (ie abundant chaff and weed seeds with very little grain). Where chaff was frequent (eg ditch 109214) grain was also frequent, so whole spikelets were probably represented. This is also true of the A120 sites up to the Early Romano-British period (see Table 34.2). However, it is probably simply due to chance (see below).
- Barley was much more common in the IA to ERB samples than in any other period. This was not the case with any of the A120 sites – barley was sparse on all sites from the IA to RB period. Barley was more frequent in the LIA/RB samples from BLS than the other two sites studied by Murphy (2004). Higher proportions of barley could relate to the local soils being more suitable for this crop (perhaps more calcareous and less heavy), or could indicate increased livestock levels at these sites, since barley was probably used primarily as a fodder crop at this time).
- Both emmer and spelt wheat were still being cultivated at least until the LIA/ERB. This also applies to the A120 sites, the Stansted sites studied by Murphy (2004) and for most other sites in southern England of this period. It was difficult to determine the relative importance of the two hulled wheats at Stansted, since so few glume bases were identifiable to species level. In all cases except LIA/ERB sample 6131, emmer chaff was greatly outnumbered by spelt chaff. However, it should be noted that the data may be biased, due to spelt chaff being more robust.
- A number of arable weed seeds first appear and increase during this period, a factor that probably relates to the widespread cultivation of spelt wheat as the primary cereal crop. These include large grasses such as chess (*Bromus* sect. *Bromus*) and perennial rye grass (*Lolium perenne/rigidum*), and a number of indicators of damp soils such as blinks (*Montia fontana* ssp. *chondrosperma*) and spike-rush (*Eleocharis* subg. *Palustres*). Weeds characteristic of acidic and nutrient-poor soils (small-seeded legumes eg *Vicia/Lathyrus* sp.) also become frequent (see Table 34.1 below). These weed groups vary in frequency from site to site for both the Stansted and A120 excavations. To some extent this reflects the variable nature of the clay soils in the area, but it may also indicate changes in crop husbandry practices, as discussed further below.

Some differences can be seen between the LIA/ERB samples and they may indicate that changes were occurring between the LIA and ER periods. However, it is difficult to confirm these changes with only seven samples. For example, emmer chaff was only positively identified in two of the LIA/ERB samples, whilst bread-type wheat was only found in two of the ERB samples. Oats appeared to become more frequent in the ERB samples when compared to the LIA/ERB samples, whilst the two samples that produced bread-type wheat (samples 371 and 2516) contained a much lower quantity of barley (one grain) than the other five samples (a ratio of 458:1 hulled wheat to barley as opposed to 7:2). Tentative suggestions of the changes taking place, therefore, are that spelt wheat increasingly replaced emmer as the main cereal for human consumption, and bread wheat began to become more important at the start of the Romano-British period. Being a free-threshing cereal, it is probably greatly under-represented in the charred plant record, as it does not need to be parched in order to remove the grain from the husk. With regards to animal fodder, barley was fairly important in the LIA/ERB but may have become replaced to some extent by the cultivation of oats in the ERB. Oats are a valuable source of high energy fodder for draft animals and they can tolerate poor, damp, acidic soils better than barley.

<u>Mid to late Romano-British</u>

Charred plant remains were recovered from the MTCP site (BAAMP00/MTCP) and LTCP/BAACP00 and LBR as follows:

C2nd-C3rd	BAACP00 109214 (19.2	<258>, context 129025 (>50 fpl) and <296>, context 129032, ditch fpl)
C2nd-C3rd	BAAMP00	<2709> context 319313 – ditch 319313 (>36.3 fpl)
C2nd-C3rd	LBR	<4013> context 207021 – ditch 207013 (70.1 fpl)
LRB	BAAMP00 334015 – pit	<2407> context 33016, <2408> context 334014, <2409> context 334013
		<2434> context 319139 - pit 319140
		<2520> context 347046 – pit 347041
		<2425> context 338015 – stoke pit of kiln 338022 (>16.9 fpl)
		<2428> context 337019 – ditch 333072 (>57.7 fpl)
		<2436> context 319148 – gully 319149 (>46.7 fpl)
		<2437> context 319150 - gully 319151 (>29.6 fpl)
		<2438> context 319153 – gully 319154 (>8.8 fpl)
		<2439> context 319158 – gully 319158

All but three samples from BAAMP00 (2709, 2516 and 2520) were in the vicinity of a kiln or oven, feature 338022. It is clear that the richness of these eight samples was associated with the operation of the oven, ie it had served as a corn drying oven for at least some of the time and chaff had been used to fuel the oven.

Activities involving the oven had led to a particular distribution of cereal remains in the surrounding enclosure ditch. Sample 2439 from near the northern terminus of the ring gully and sample 2407 from nearby pit 334013 produced fairly clean, processed emmer/spelt grain samples, with just a few spelt chaff fragments and very few weed seeds remaining as contaminants. Samples 2436, 2437 and 2438, however, from the gully terminus to the south of the oven, all produced chaff-rich assemblages indicative of cereal processing waste. Only one straw node was recorded, weed seeds were not frequent and the weed taxa represented were mostly large, heavy-seeded types. It is likely, therefore, that this was the waste product from removing the husks from fairly clean spelt spikelets. The spikelets would have been parched in the oven in order to make the husks brittle, before being pounded, winnowed and sieved to remove the brittle husks (Hillman 1981). It is unlikely, however, that the cereal processing waste had then simply been burnt as waste. Processing waste was a valuable fuel for ovens and kilns, so the presence of these large deposits in the ditch probably represent fuel cleaned out of the oven that had been dumped in the southern end of the gully. The concentration of waste was highest directly to the south of the oven, trailing off towards the terminus of the gully.

The sample from stoke pit, 2425, was not as rich in charred plant remains as the gully samples. The cereal to chaff proportions indicated that the remains of charred spikelets might have been represented (perhaps spikelets that had accidentally fallen into the fire), although a mixture of clean grain and chaff burnt as fuel is equally as likely in a context of this nature. Weed seeds, however, were fairly rare, so if chaff was being used as fuel it was probably only the waste from dehusking clean spikelets, and not the straw and weed-rich waste products from earlier stages in the processing. One further possible use of the oven was for roasting malt, although the relatively low occurrence of sprouted grains and detached sprouts suggests that this was likely to have been sporadic, if at all (see discussion below).

Spelt wheat and possible bread wheat were the only two cereals present in the oven, but it is interesting to see that peas may also have been present (cf. *Pisum sativum*). Leguminous crops are often under-represented in the charred plant record, so their presence in the oven was a useful reminder that other crops were probably being dried prior to storage or grinding into flour, in addition to cereals. A few possible peas were recovered from the A120 and Stansted Airport 1986-91 (Murphy 2004) samples.

Sample 2434 from the primary deliberate backfill of pit 319140 to the south-west of the oven produced a grain-rich deposit with few weed seeds, some spelt and possible emmer chaff and remains of hay from damp meadows. The hay consisted of grass-sized stem fragments, sedge seeds (*Carex* spp.) and a sheep's sorrel nutlet (*Rumex acetosella*). Of particular note in this sample was the relatively large number of rye (*Secale cereale*) grains (23 grains) – the most recovered from any of the periods studied. A few oats were also recorded, but it is not known whether these were from wild or cultivated oats. The hay, rye and oats were probably present as fodder. Rye is not commonly recovered in substantial quantities from Romano-British deposits, although occasional grains are quite common. Murphy (2004) recorded a single rye rachis fragment from site BLS, and several possible rye grains have been recorded from other Romano-British A120 and Stansted samples. This low but common occurrence is typical of cereals that were being cultivated for fodder, as they are less likely to become charred during processing (processing would have been less thorough for fodder crops), but more likely to have been widely strewn around the settlements as unburnt waste, occasionally becoming charred amongst mixed domestic waste.

The three samples located some distance from the ring-gully produced more mixed types of waste. The greater range of weed taxa recorded was probably due to the presence of hay and other waste materials in the samples. Sample 2520 in pit 347041 appears to have been a deliberate dump of charred spelt spikelets, with some straw and hay. Sample 2709 was a grain-rich deposit that also contained some domestic waste, including hazelnut shell fragments and a sloe stone. The wide range of weed taxa represented in these samples was probably due to the inclusion of burnt hay from damp meadows.

During the mid to late Romano-British period both emmer and spelt wheat were still being grown, although spelt appears to have been by far the dominant cereal grown for human consumption, according to the best preserved chaff deposits. Emmer may have persisted as a volunteer crop for a while, or it might have been more often used for fodder. Bread-type wheat was present in more samples than in earlier periods, but the grains still occurred in low numbers.

It is notable that very little barley was recovered from these samples, perhaps because both rye and oats were being grown as fodder crops in its place. This is difficult to demonstrate from so little evidence, and it was not possible to confirm the identification of cultivated oat. However, the frequency of oat awns and grains suggests that a significant quantity of oats were being grown. For the A120 sites, evidence for large-scale spelt cultivation from the charred plant remains, in addition to pathological evidence from the animal bones, demonstrated that a great deal of ploughing of the heavy clay soils was taking place during this period. Since oats are a valuable high-energy fodder for draught animals, they may have been far more important to the RB economy than the charred evidence suggests.

Other plants that are likely to be under-represented in the charred plant record but which may have been of economic importance during this period are a) fibre crops, b) fruits and nuts, c) legumes, d) vegetables, e) herbs and spices and f) medicinal plants.

a) A single flax (*Linum usitatissimum*) seed was recovered from BAACP00 ditch sample 258 (C2nd-C3rd), indicating that, like many other RB sites, this fibre crop was being cultivated. Flax seeds also produce a useful oil, and they can be consumed for medicinal purposes, eg as a laxative.
b) Hazelnut shell (*Corylus avellana*) was present in eight of the twenty-two LIA/ERB to LRB samples, four of which produced quite a few fragments. Sloe stones (*Prunus spinosa*) were present in three C2nd-C3rd samples (4 stones; ditch 109214 and ditch 319313), which is a relatively large number for charred remains, when compared with other sites. Rose (*Rosa* sp.) and hawthorn (*Crataegus monogyna*) seeds were also recovered from ditch 109214. It is interesting to see that no imported exotic fruits or nuts were present in the samples. Admittedly charring does not favour the preservation of these types of remains, but that is the case with all of the economic plants discussed in this section. An ERB waterlogged ditch sample from the A120 sites added only a couple more native fruits to the list of possible food plants (bramble and elderberry), and a similar range of wild taxa was recovered from the 1986-91 excavations, with the addition

of possible wild strawberry (Murphy 2004). This underlines the rural nature of the economy – good, plain food supplemented by native hedgerow fruits and nuts, with no evidence of imported luxury produce.

c) Three samples (C2nd-C3rd and LRB) produced possible peas with one pea (*Pisum sativum*) being positively identified due to the presence of an intact hilum (detachment scar). No beans (*Vicia faba*) were found, although they have been recorded from other Romano-British sites.
d) It is impossible to tell how many of the edible native species had been exploited as leafy and root vegetables, particularly since these types of plant tissues are unlikely to survive charring in a recognizable form. Of the list of wild taxa represented during the Romano-British period, plants such as wild carrot (*Daucus carota*) and orache (*Atriplex patula/prostrata)* are known to have been consumed in classical and later periods (Harrison *et al.* 1969). Mallow (used as a leaf vegetable) was present in the A120 samples.
e) No imported herbs or spices were recovered from the samples. Imported spices such as coriander and dill are commonly recovered from urban Romano-British sites, occasionally even as charred remains.
f) Unless large quantities of remains from native species such as hemlock (*Conium maculatum*) and henbane (*Hyoscyamus niger*) are recovered it is impossible to determine whether they had been used for medicinal purposes. However, their common occurrence in the British Isles as charred remains in Romano-British samples, in comparison with samples from other periods, suggests that they were being gathered or grown for medicinal purposes. In addition, classical references demonstrate that the medicinal properties of poisonous herbs such as these were well-understood. Even if these particular seeds from C2nd-C3rd ditch 109214 (which contained a wide variety of other edible remains including cereals, legumes, flax, fruits and nuts) had not been deliberately gathered for use, the fact that these plants were present in the area means that they would, undoubtedly, have been made use of. Seeds, leaves and roots of both plants have been used (externally!) to relieve swellings and pains, including earache (Culpeper 1826).

The C2nd-C3rd sample from site LBR <4013> produced a concentration of spelt processing waste that was similar to those from BAAMP00, with a trace of bread-type wheat, barley, possible rye, oats and emmer. There were no noticeable differences in the weed composition or crop composition with the BAMP00 samples, so they may well originate from the same period of activity.

Comparisons between the LIA/ERomano-British and mid/late Romano-British samples

The interpretation of the assemblages depends to a large extent on whether each sample of charred plant remains came from a single type of burnt waste, or whether a mixture of waste materials were deposited in the features. Material from sources other than cereal processing were obviously present, since charcoal, hazelnut shell fragments (*Corylus avellana;* LIA to LR), sloe stones (*Prunus spinosa;* C2nd-C3rd), cultivated flax (*Linum usitatissimum;* C2nd-C3rd) and peas (*Pisum sativum;* Late Roman) were recovered. With regards to the weed taxa, however, it is more difficult to determine whether they were growing as arable weeds or were deposited amongst burnt waste hay or turf. This is because many plants that were growing as arable weeds at the time will grow in a wide range of habitats, including disturbed areas of grassland, wasteground, waysides and cultivated soils. The situation is complicated further by the possibility that an arable crop may have been sown in fields that were previously down to grass, and grassland taxa may have persisted as arable weeds for a while. For this reason the main taxa used to provide information about crop husbandry were weeds that occurred in a large proportion of the assemblages, such as small-seeded legumes (*Vicia/Lathyrus* sp.), blinks (*Montia fontana* ssp. *chodrosperma*) and chess (*Bromus* sect. *Bromus*). This is also the case where comparisons between sites and periods have been made.

The occurrence of small-seeded leguminous weeds such as vetches, clovers and black medick (*Vicia/Lathyrus* sp., *Trifolium/Medicago lupulina/Lotus* sp.) is indicative of soils with a low nitrogen content. Long-term experiments on the Broadbalk plots at Rothamsted Experimental Station have shown that a group of weeds including black medick and red bartsia (*Odontites verna*) are dominant on wheat plots with soils that are low in nitrogen, but decline rapidly when nitrogen levels are increased (Moss 2004). The high occurrence of these two taxa in the LIA to MRB samples suggests that nitrogen levels were low during this period. By the later Romano-British period, however, these taxa were present in much lower levels (see Table 34.1). Since fairly intensive spelt cultivation appears to have been occurring at this time, manuring must have been taking place in the later Romano-British period to have caused these changes. In addition to restoring fertility to the soil, manuring helps to improve the structure and drainage of clay soils, a fact that was undoubtedly known to the Romans. The alternative explanation is that arable cultivation moved to more fertile soils, but by this period the most promising soils in the locality are likely to have been ploughed for several centuries.

Other differences between the samples listed in Table 34.7 are more difficult to interpret, since they may reflect differences in the soils at the sites rather than changes through time. Some of the differences relate to soil moisture content and, although difficult to interpret with any certainty, could reflect differences in drainage activities, eg the smaller number of seeds from wet-ground weed taxa in the later period could indicate improved drainage regimes or movement to drier areas. Others could relate to crop husbandry practices, eg lower levels of large-seeded weedy grasses (chess and *Lolium*-type) in the later period could indicate increased weeding of the crops. Since the local clay soils show wide variations in qualities such as moisture content and pH (Macphail, pers. comm.), interpretations are at present tentative until a larger number of sites on the Boulder clay has been investigated. The following changes that appear to occur between the C2nd-C3rd and LRB, however, have been validated to some extent because the main site of interest (BAAMP00) produced mostly LRB samples but one C2nd-C3rd sample showing different characteristics.

Sample 2709 (C2nd-C3rd) produced a grain-rich assemblage with frequent small leguminous weed seeds, several wetground weeds and an acid soil indicator. It also contained no bread-type wheat. All of the later Romano-British samples from the same site produced sparse leguminous weed seeds, few wetground weeds and virtually no acid soil indicators (Table 34.7). Weed seeds in general were scarce in the LRB samples, and this applied equally to the grain-rich, spikelet-type and cereal processing waste assemblages. Most of the LRB samples contained a few bread-type wheat grains. The differences between the periods appear to reflect changes in crop husbandry practices. The later crops must have been much more intensively weeded in order to remove difficult to spot, invasive grasses like chess and rye-grass. The only weed seeds present in any quantity in the LRB samples were from docks (*Rumex* sp.) – perennial weeds with long, fleshy tap roots. Docks cannot be eradicated by hand-weeding, as any sections of their long, tough tap roots that get left in the ground can re-grow. Even deep ploughing will only serve to propagate docks, unless all the fragmented sections of root are picked out by hand. This is particularly difficult to do in a clay soil. Dock seeds were frequent from the LIA onwards but became particularly numerous in the C2nd-C3rd samples, possibly due to increased autumn ploughing giving the docks a head start on spring germinating annual weeds. Stinking chamomile (*Anthemis cotula*) made its first appearance in the C2nd-C3rd samples. This is a weed typical of heavy, damp soils that is often linked to increased ploughing of clay soils for spelt crops during the Roman period (Jones 1981).

Although hand weeding may have decreased tall-growing, obvious weeds such as chess and rye-grass, it is unlikely to have completely eradicated low-growing, twining weeds such as the small-seeded legumes. Therefore, the reduction of leguminous weeds in the LRB is more likely to be due to soil improvement (ie manuring), as is the reduction of wet ground weeds (improved drainage). Sedges and spike-rush are fairly low-growing, inconspicuous weeds that are not invasive or particularly problematic to the farmer, so they are unlikely to have been sought out during hand weeding.

Although concentrations of charred cereal remains greatly increased from the Late Iron Age through to the Romano-British period, it was not until the late Roman period that large deposits of cereal processing waste occurred on the Stansted sites. Samples from E/MRB Strood Hall and Rayne Roundabout (A120 sites, Carruthers 2007) produced some deposits of this nature (Table 34.8), but at Stansted it was only in the late Roman samples from a ring gully around a corn drier at BAAMP00 that this type of waste was found. However, it is likely that the lack of processing waste (CPW) from the earlier Romano-British samples at Stansted is only due to the chance nature of sampling. The concentration of CPW in the ring ditch samples illustrates this point, showing that different types of waste can be very localised in distribution. This is particularly the case if CPW was a valued commodity that was collected and stored for use as fuel in corndriers, as it would then not find its way into general domestic waste in any quantity or become widely distributed around the site.

The combined evidence from the A120 and Stansted sites indicates that the scale and organisation of spelt production increased from the C2nd-C3rd into the LRB. Changes in crop husbandry practices were probably essential in order to obtain high yields. Although clay soils are fertile when first cultivated, they soon become impoverished if nutrients are not returned to the soil in large-enough quantities. As modern agricultural practices have shown, weed and pest problems usually become worse as crops are grown on a larger and more intensive scale. Hand weeding became more necessary by the LRB, perhaps because of loss of yield, but also possibly because grain standards may have become more strictly regulated and weed contamination was no longer tolerated. Increased incidence of sprouted grain from the MRB onwards (Table 34.8) could relate to brewing, but no definite assemblages of malted grain have been found on the Stansted sites. Comparing quantities of sprouted grains and detached sprouts at Stansted to a confirmed deposit of malting waste such as that recovered from Northfleet Roman Villa, Kent (Smith in prep.), the evidence for malting was much less convincing at Stansted. Only one sample (2437, gully fill close to oven 338022) contained enough sprouted remains, and even this must have been mixed with dehusking waste. Because spelt began to be dehusked on a large scale during this period (rather than being stored in the better-protected spikelet form, as in earlier periods), the grain was more vulnerable to damp. Dehusking may have been a requirement for military purposes, or it may have been carried out in order to make the crop more fit for market, or to reduce transport costs.

Other changes seen over these periods include the increased occurrence of bread-type wheat, and the replacement of barley as a fodder crop with oats and rye – two cereals that will tolerate poorer soils and damp climates better than barley. Peas were being grown from the C2nd-C3rd, and these may have helped to improve soil fertility if grown in rotation with cereals. Flax (*Linum usitatissimum*) was also cultivated at this time, and its importance may have been much greater than the sparse evidence suggests.

Taking into account the biases of preservation by charring, it is interesting to note that no exotic fruits, herbs or spices were found. Wild, hedgerow fruits and nuts were still important in the mid to late Romano-British, although fewer hazelnut shell fragments were found in the LRB samples. This could suggest further removal of hedgerows, scrub and woodland, perhaps in order to increase arable production.

The Late Saxon period

Very few deposits dating to this period have been excavated in the Stansted region, so an examination of the six samples listed below has helped to fill a gap in the chronology.

BAAMP00	Sample 2004, context 309032	}
	Sample 2005, context 309033	} beamslot 302020
	Sample 2019, context 315009	}
	Sample 2068, context 307012	}
	Sample 2211, context 322008	– pit 322007
	Sample 2212, context 315052	– pit 315051

The main component of the beamslot fill was oat grains. Comparisons between the four beamslot samples showed that the assemblages were very similar in character. The grains were concentrated in the upper fill of the slot, towards the western-most corner of the building. Since it is thought that this building burnt down (see Chapter 9), the assemblages appear to represent an accidentally burnt deposit of clean, processed oats that had been stored in the corner of the building. After the building bunt down, the oats probably spilled into the beamslots. The few bread-type wheat grains, possible rye grains, weed seeds, damp hay taxa and hazelnut shell fragments recovered with the oats could have been contaminants of the crop, or could have been from other waste that was lying on the floor. It is interesting that eleven emmer/spelt grains and an emmer/spelt glume base were present in one of the lower samples, 2019. Hulled wheats are rarely found in post-Roman contexts, having been rapidly replaced by free-threshing bead-type wheats by the Saxon period. However, occasional small quantities of hulled wheats have been recovered from later deposits, including a sample radiocarbon dated to the C15th at Brough St Giles (Huntley 1991). A radiocarbon date from one of the emmer/spelt wheat grains from beamslot 302020 produced a Late Saxon date of AD 960-1040 ± 30 (NZA-23235) demonstrating that small amounts of hulled wheat (probably spelt) were still being grown at this time.

Because this deposit probably represents a single event, it is not possible to determine how important oats were in relation to other cereals at the time. The only other assemblages of this date in the area were from possible Saxon pit fills at the SCS site examined by Murphy (2004). These produced a few oats, in addition to some hulled wheat remains. Although Murphy suggested that the hulled wheat remains may have been residual, it is now clear that hulled wheats continued as a minor crop in this area. Spelt wheat grows well in heavy clays, often producing higher yields than free-threshing wheats, particularly in areas with milder winters such as southern England (van der Veen and Palmer 1997). Alternatively, having been grown on such a large scale during the RB period on the boulder clay, it could have persisted for a while as a volunteer crop. This is perhaps less likely because hulled wheats require different processing methods to separate the grain from the chaff, so, unless growing as weeds of fodder crops, volunteer plants would probably have been weeded out rather than tolerated.

Samples 2211 (pit 322007) and 2212 (pit 315051) were from features towards the southern end of the site. Sample 2211 came from a secondary fill of ashy material that may have been used to dampen the smells from cessy material. Unfortunately the residue from this sample was not available for microscopic examination, so it is uncertain whether faecal material had been preserved in the feature. The flot produced several well preserved charred Celtic beans (*Vicia faba* var. *minor*) and a quantity of free-threshing wheat. The presence of a couple of well preserved rachis fragments suggests that both rivet-type wheat (*Triticum turgidum*-type) and bread-type (*T. aestivum*-type) wheat were being grown. Since the two types of wheat have different culinary properties and different growth requirements there can be advantages in growing both types (Moffett 1991). Rivet wheat is used for biscuits, whilst bread wheat produces a well-risen loaf of bread. Rivet wheat grows on a long straw which is useful for thatching. It is also awned and so has better protection from bird predation, and is rust resistant. However, it is more sensitive to bad weather and is late-maturing. An increasing amount of evidence suggests that both types of wheat were grown during the medieval period in many parts of Britain, particularly central and southern areas (Moffett 1991). A Late Saxon date is a fairly early record for rivet-type wheat, but an AMS date of cal AD 770-100 (1150±45 BP) (OxA-10126) has been obtained from rivet-type wheat remains from Higham Ferrers (Moffett

2007, 169). Sample 2211 also produced small amounts of rye and oats, but no barley was recovered from any of the six samples. Barley is the least well-suited cereal for heavy clay soils, so by the Late Saxon period its place as a fodder crop had probably largely been taken by oats, rye and legumes.

Sample 2212 primarily comprised free-threshing wheat grains, with just a few chaff fragments and weed seeds. Both 2211 and 2212 probably originated as domestic waste, either as processed grain accidentally burnt during cooking or as deliberately burnt infested grain. Both samples contained a few fragments of hazelnut shell, indicating that other types of waste were mixed into the deposit. They also contained a few larger (3 mm diameter) vetch/tare (*Vicia/Lathyrus* sp.) seeds which may have been cultivated vetch (*Vicia sativa* ssp. *sativa*). Cultivated vetch was identified by Murphy (2004) in medieval samples from the RWS and tentatively identified at Blatches, A120 (Carruthers 2007). It was commonly grown as a fodder crop during the medieval period, but its status during the Late Saxon period is less clear. Possible cultivated vetch seeds were present in Late Saxon deposits at West Cotton, (Campbell 1994), but as the seeds from Stansted were not well-enough preserved to confirm the identification (no hila were observed) the record must remain as vetch/tare. A Late Saxon sample at Stansted Southgate, however, did produce more convincing evidence for the cultivation of vetches.

<u>Early medieval period</u>

A pit fill and two cess pit fills from site BAAMP00 were dated to this period:

Sample 2741, context 366004	– pit 366001
Sample 2737, context 310139	}
Sample 2738, context 310140	} cess pit 310136

Sample 2741 from pit 366001 towards the northern end of the site produced an assemblage of grain, straw and weed seeds that had probably been burnt at a high temperature, causing ‘melting’ of grain and straw into slaggy lumps. The remains that survived in an identifiable state consisted of free-threshing wheat grains (*Triticum aestivum/turgidum* -types) and chaff, straw nodes and frequent weed seeds. Stinking chamomile was particularly frequent, providing evidence that the cereals were being grown on the local heavy, clay soil. This deposit may have consisted of an unprocessed deposit of cereals, perhaps ears still on the straw.

The early medieval cess pit 310136 was located some distance to the north of the burnt Late Saxon building. The samples produced a few charred bread-type wheat grains, hazelnut shell fragments and arable weed seeds, but the main component of the assemblages recovered from flots and residues was mineralised (calcium phosphate replaced; see Green 1979) plant material. The presence of frequent concretions containing bran fragments and fragments of legume seed coat (testa) confirmed that the material was of faecal origin. Further evidence for this was that edible plant remains, such as fruit seeds, were the dominant components. The few remains from non-edible taxa such as buttercup (*Ranunculus repens/acris/bulbosus*) and sedges (*Carex* spp.)

probably came from hay that had been used as toilet paper, or had been added to soak up liquids and dampen odours. Grass/rush/sedge stem fragments were present and were frequent in the lower of the two deposits. The charred remains may also have been added to suppress smells, having perhaps originated as sweepings from a hearth or oven.

Sample 2737 came from context 310139; a large deposit containing an intact cattle skull and frequent well preserved cattle bones. It overlay a deposit containing burnt bone that had been dumped into the north side of the pit (context 310140, sample 2738). Both samples produced very similar concentrations of remains suggesting that conditions of preservation and formation processes had been similar. Minor differences in quantities of the different food remains were observed between the samples, but since only two samples were examined it is difficult to say whether this simply reflects variation within each deposit or a larger scale slight change in the diet, perhaps due to seasonal changes. Therefore, although the differences are described below the significance of these should not be over-emphasized.

Numerically, bramble (*Rubus* sect. *Glandulosus*) seeds were the most frequent component of both samples, not including the cereal bran and legume testa fragments which were too numerous to be quantified. Sample 2737 produced roughly twice as many bramble seeds as 2738 (per litre of soil processed). Many of the seeds in 2738 were preserved without their seed coats (*Rubus* sp., possibly including raspberry but not confirmed), indicating that conditions of preservation in the pit may have been wetter by the time 2737 was deposited (see Carruthers 1993). Each bramble fruit contains numerous seeds, so a single meal could make this type of numerical difference. In addition, brambles are easily preserved, so it is not possible to suggest that this has a seasonal implication.

Other fruits were also well-represented, including crab apple (*Malus sylvestris* and *Malus/Pyrus* sp., possibly including pear, but not confirmed), damson or bullace (*Prunus domestica* cf. ssp. *insititia* embryos), sloe or cherry (*P. avium/spinosa* embryos) and possible strawberry (*Fragaria/Potentilla* sp.). Apple pips were much more frequent in sample 2738, but *Prunus*-type fruits were relatively frequent in both samples.

Both peas (*Pisum sativum)* and beans (*Vicia faba*) were being consumed, identified from fragments of macerated testa with hilums attached. One whole pea was recovered from 2738 indicating that at least some of the legumes had been consumed as vegetables rather than ground into flour. However, the presence of frequent concretions consisting of curled fragments of legume testa with bran fragments inside could indicate that some legume flour had been mixed in with the cereal flour to make a low-status bread (Tannahill 1975). Legume testa fragments were much more frequent in sample 2738 than 2737.

Apart from the crop plants, the only non-native taxon represented in the faecal deposits was opium poppy (*Papaver somniferum*), but this oil-seed and medicinal plant was introduced into the British Isles from at least the Iron Age (Godwin 1975). No exotic fruits or spices were present in the samples, indicating that the early medieval diet at

Stansted was fairly rural in character, consisting of cereals, legumes, hedgerow fruits and nuts and an unknown range of leafy and root vegetables that leave little trace in archaeobotanical assemblages.

Very similar results were recovered from three Saxon cess pits at Abbots Worthy, near Winchester (Carruthers 1991). Additional plants being exploited at Abbots Worthy included elderberry, probable mustard (*Brassica/Sinapis* sp.) and perhaps a few native medicinal plants such as henbane and hemlock. The only non-native taxon was, again, opium poppy. In comparison with Stansted, fewer fruit remains and more pea hilums were recorded at Abbots Worthy. A more urban type of diet was indicated in the large number of Middle Saxon cess pits excavated at St Mary's Stadium, Hamwic (Carruthers 2005). A similar range of native fruits were present, but these were much less prominent than leguminous remains. The only evidence of imported fruits was a single waterlogged grape pip (Clapham 2005). However, a few imported herbs were available to the Hamwic population, including dill, coriander and possible fennel. Perhaps the reduced access to hedgerow fruits and nuts was compensated for by adding herbs to the monotonous diet of pea, bean and cereal dishes. It may also be relevant that pot herbs such as these could easily be grown in the more restricted space of an urban settlement.

These few findings from the Late Saxon and early medieval periods are very similar to those from the A120 sites and the Stansted sites examined by Murphy (2004), ie both bread-type and rivet-type wheat were the principal crops, with smaller quantities of the other cereals, beans, peas and possibly cultivated vetch. Hedgerow fruits and nuts were relatively common in the samples. Murphy also recovered evidence for the cultivation of flax and for malting. The only slight evidence for exotic foods in this area was a single pollen grain of grape from a cess pit at Stebbingford (Wiltshire 1996).

<u>Post-medieval</u>

Samples from this period were associated with a hunting lodge set in parkland (Nick Cook and Fraser Brown, pers. comm.). Five samples from site BAACP01 were examined, including two from hearths, one from a rectangular feature in a palaeochannel and two from a well. The well produced only charred material in the upper layer but well-preserved waterlogged remains from the primary fill, demonstrating the level to which it had remained waterlogged.

Sample 840, context 467028 – hearth 459026
Sample 841, context 467030 – hearth 467032
Sample 909, context 464037 – feature 464035
Sample 920, context 461027 – well 461038, upper fill
Sample 921, context 461035 – well 461038, primary fill

As with the medieval samples, the hearth samples were dominated by free-threshing wheat grains with both bread-type and rivet-type wheat being identified from a few well-preserved rachis fragments. Sample 841 produced very little charred material, but it included two possible peas and a possible oat grain. A well preserved pea was also present in sample 840, confirming the importance of this crop. Sample 840 contained a surprisingly large amount of cereal chaff, including chaff from the two types of wheat, barley and rye. This may represent cereal processing waste that was being used as fuel, or unprocessed crops could have been parched or burnt amongst waste in the fire.

Sample 920 from the well also contained wheat, barley, oats and possible rye, with a reasonably large number of chaff fragments being preserved. Only rivet-type wheat was identified amongst the rachis fragments. A bean fragment was also present. The waterlogged primary fill, sample 921, contained abundant wood fragments, twigs, buds, rose and hawthorn-type thorns and some leaf fragments. This woody material may have fallen into the well or been dumped as waste after it was abandoned. It seems unlikely that trees and shrubs would have been allowed to grow close to an uncovered, active well, as falling leaves would taint the water. However, the well may have been covered while it was in use, and material may have accumulated post-abandonment. The plant remains suggest that it was situated in a woodland clearing or close to woods, scrub or hedgerows. Seeds from several herbs of woodland margins were present, such as agrimony (*Agrimonia eupatoria*) and hedge woundwort (*Stachys sylvatica*). Cow parsley fruits (*Anthriscus sylvestris*) were numerically the most abundant items, and this is typically a plant of hedgerows and woodland margins. Not counting the edible taxa, immature hawthorn berries (*Crataegus* sp.) were the only identifiable tree/shrub remains. Damson-type stones (*Prunus domestica* ssp. *insititia*) were probably deposited as waste, since a couple of other edible plants were also represented; grapes (*Vitis vinifera*) and peas (*Pisum sativum*). A small fragment of corn cockle seed (*Agrostemma githago*) indicated that the edible remains may have entered the well as sewage, since corn cockle fragments are typically recovered from waterlogged cess deposits (having been present as a contaminant of grain that had been ground to make flour and made into, eg bread). Being large seeds, however, the fruit and legume remains could also have been deposited as waste. The grape and damson/bullace seeds provide a small amount of evidence for the consumption of ‘luxury’ foods. The grapes would probably have been imported, although local cultivation is not impossible. Grape vines like a deep, well-drained soil that is not chalky, so perhaps cultivation is unlikely on clay. Damsons/bullaces may well have been grown in orchards or in hedgerows belonging to the hunting lodge. It has been suggested that an area of discoloured soil containing no features close to the well may have been orchards or gardens, and that several shallow ditches in the area may have been hedged (Fraser Brown, pers. comm.). Since a single possible box leaf (cf. *Buxus sempervirens*) was recovered from well sample 921, clipped box hedges may have been used, as was popular during the 16th century.

The remaining taxa represented in this feature were primarily weeds of disturbed ground, grassland and waysides, some of which indicated damp soils and others preferring dry, calcareous soils. They may represent plants growing around the well and/or hay or dung deposited in the well as waste after abandonment. The presence of a few seeds from plants that typically grow as arable weeds (eg shepherd’s needle (*Scandix pecten-veneris*); stinking chamomile (*Anthemis cotula*)) could mean that dung from grazing livestock had fallen into the well (with crop processing waste having been used as fodder), or that a little processing waste had been deposited. However, no cereal chaff was preserved so, if present, it was only in low concentrations. Stinking chamomile can also grow on wasteground. No true aquatic plants were represented although cladoceran ephyppia (water-flea eggcases, eg *Daphnia*) were frequent, and these are common in standing water. The well was either covered or too frequently used to allow plants such as duckweed to become established. After abandonment, it must have quickly become backfilled with woody material.

In contrast, the rectangular feature in the palaeochannel produced a wide range of aquatic and marshland plants, as might be expected from a deposit in this location. Free-floating aquatics such as duckweed (*Lemna* sp.) were scarce, but marginals such as sedges, (*Carex* spp.) water plantain (*Alisma plantago-aquatica*), water pepper (*Polygonum hydropiper*) and flote-grass (*Glyceria* sp.) were common. Other marshland plants included branched bur-reed (*Sparganium erectum*), rushes (*Juncus* sp.) and spike-rush (*Eleocharis* subg. *Palustres*). The remaining taxa were primarily herbs of grassland and disturbed places, although the disturbed element was not dominant. The numerically most frequent seed was a cinquefoil, probably creeping cinquefoil (*Potentilla* cf. *reptans*; 87 seeds). This creeping perennial is not often recovered in large numbers from archaeobotanical samples, although it is a common plant of rough ground, grassland and hedgebanks. Interestingly, Ellenberg (1988) places it in a plant community described as 'pioneer swards of flooded and damp places' (669; 3.72: Order *Agrostietalia stoloniferae*). The creeping root systems of plants such as creeping cinquefoil enable them to rapidly become established and to keep a foothold during flooding episodes. Other possible members of this group observed in sample 909 (but not identified to species level) were mint (*Mentha* sp.) and creeping buttercup (identified only to *Ranunclus repens/acris/bulbosus*). This suggests that the enigmatic rectangular feature was located in an area that was periodically flooded, a factor that could be important in understanding its function.

A single hop fruit (*Humulus lupulus*) was the only taxon of note. Along with a bramble seed (*Rubus* sect. *Glandulosus*), twigs, thorns, buds and leaf fragments, this taxon suggests that wet woodland existed along the palaeochannel in the vicinity of the feature. Unfortunately, no concentrations of plant material were recovered from the bottom of the feature to help determine its function, a common problem for features of this nature. Although hops can be used for brewing and dyeing, the presence of a single seed is inconclusive, and the location seems unsuitable for such activities.

The charred plant remains from this period were very similar to those from the medieval period, with all five cereals being recorded (although barley was not present in the three medieval samples). Peas and beans and possible cultivated vetch were relatively frequent, considering so few samples were examined (one 2-3 mm vetch/tare seed from sample 840 could have been from cultivated vetch). Stinking chamomile was a frequent arable weed in samples from both periods, as might be expected for crops grown on heavy, damp clay soils. The waterlogged remains provided a small amount of evidence for the consumption of 'luxury' foods, ie grapes and damsons. The remaining evidence from these features provided information about the local environment, which appeared to retain some scrub or woodland with marshy areas along the palaeochannel.

Summary

Little environmental evidence has been recovered from excavations in the Stansted area to suggest that woodland on the Boulder clay had undergone significant disturbance during the early prehistoric period. Although charred hazelnut shell fragments in Neolithic pit 353011 were likely to have been collected from local trees, the bread-type wheat grain may have been brought to the site. In any case, arable cultivation appears to have been very limited in the area up to the Late Iron Age. Two charred cereal deposits were recovered from Middle Bronze Age pits on the LTCP (BAAMP00) and M11 sites (BAALR00), but concentrations of charred plant remains were fairly low. Emmer wheat, spelt wheat and hulled barley were being grown on a small scale during the Bronze Age and Early Iron Age, but there was no evidence to confirm that this was taking place on the local heavy clay soils. More easily worked soils in the valley bottoms may have been used at this time.

By the Late Iron Age several samples from the M 11 (BAALR00) and the LTCP sites (BAACP00) produced much higher concentrations of charred cereal remains. Changes to the landscape, artefactual evidence and the environmental evidence all indicated that the level of settlement and agricultural development of the area increased from the LIA onwards. From the arable perspective, emmer, spelt and barley were still the principal crops during the LIA/ERB period, although oats may have been introduced as an energy-rich fodder crop. The high incidence of small-seeded leguminous weed seeds in these samples suggests that nitrogen depletion of the soil could have become a problem.

By the late Roman period this was no longer the case, even though large-scale spelt cultivation was occurring at the time. This suggests that manuring was taking place. Other improvements in crop husbandry may also have been adopted, such as improved drainage of damper areas and hand-weeding of fields, since the overall number of weed seeds, particularly wet-ground taxa, was much lower in the later samples. Stinking chamomile seeds, a weed of heavy clay soils, occurred in Mid-Roman and later samples, indicating the cultivation of boulder clay on the plateau. An increased range of fodder crops was probably being grown during the later RB period including both oats and rye. However, separation of the crops appears to have been much greater, since the spelt processing waste (which was by now being produced in large quantities) was very pure, with few contaminants such as weed seeds or relict crops. Spelt cultivation and large-scale processing was taking place on the site during the mid to late Romano-British period, necessitating the use of corn driers in order to process large quantities of grain at a time. This marks a distinct change from earlier periods, where cereals would have been stored in semi-processed spikelet form and been processed on a small scale, as required for cooking. It suggests that spelt wheat was being traded during the later Romano-British period rather than being solely grown for local use, as longevity in storage was obviously less important than ease of transport (clean grain is less bulky to transport but is more susceptible to insect and fungal attacks). Additional crops being grown were flax and peas, and a range of native fruits and hazelnuts were being collected from the hedgerows. Bread-type wheat, which was recovered in small quantities from the LIA onwards (as well as the single Neolithic grain), became more frequent in the later Romano-British samples but was still a minor component. This, however, could be a gross under-representation, since free-threshing cereals do not require parching prior to dehusking, unlike emmer and spelt wheat.

By the Late Saxon period free-threshing bread-type wheat had become the dominant cereal grown, as is the case in most areas of the British Isles. However, only a small number of samples of this date have been excavated in the Stansted area, and in three samples from a burnt-down building on the LTCP site (BAAMP00) oats were dominant. A little rye and a few hulled wheat grains were also present amongst the charred remains. A radiocarbon date on one of the hulled wheat grains confirmed that this cereal (probably spelt wheat) continued to be grown into the Late Saxon period.

Information about the early medieval diet was greatly increased by the excavation of two cess deposits containing mineralised plant remains. The assemblages revealed the occupants to have had a fairly simple diet of cereals, legumes (peas and beans), native fruits and nuts (brambles, apples, damson/bullace, cherry/sloe, hazelnut), with opium poppy being used as a flavouring. Fruit remains were notably frequent in comparison with other faecal deposits examined by the author (eg Carruthers 2005). The small number of other medieval and post-medieval charred samples examined produced only one major change – the introduction of rivet-type wheat in addition to bread-type wheat. As in the Late Saxon period, rye and oats were being cultivated, though probably only for fodder, since their occurrences were low. Barley was only recovered from the Post-Medieval samples, so perhaps cultivation of this crop was abandoned for a while because of the unsuitability of the heavy clay soils. Peas and beans continued to be important, possibly being used in crop rotations, and cultivated vetch may have been grown during the Late Saxon to medieval periods, although this identification has not been confirmed. The only additional fruits that may have been imported or grown in orchards and gardens at the hunting lodge during the post-medieval period were grapes and damsons. Since only a few waterlogged samples were examined, all of which were fairly devoid of domestic waste, this lack of evidence for luxury goods could be due to the limitations of archaeobotanical preservation. It is interesting to note that both peas and beans were still being used at the hunting lodge, since legumes were often seen as ‘peasants food’. However, they may have been grown as fodder for livestock, game birds or for the staff.

It is interesting to see that, despite the difficulties of cultivating the Essex Boulder Clay, very few differences in the timing of the major crop species introductions were found in comparison with other sites across southern and central England. Once suitable ploughs had been developed to cope with the heavy, clay soils the landscape must have been rapidly transformed, particularly during the Late Iron Age and Romano-British periods. This may relate to the fact that, at this time, spelt wheat and bread wheat were the principal crops being used for human consumption, and out of all of the cereals these taxa were the best suited to heavy soils. Possible improvements in crop husbandry practices during the later Romano-British period, including manuring and weeding, must have lead to good yields being obtained from the boulder clay, since this area appears to have been deliberately selected for large scale spelt cultivation and processing earlier in the period than in most parts of the British Isles. Large deposits of spelt processing waste are more commonly found on late Romano-British sites, but in the Stansted area they occurred on some early and middle Romano-British sites (Table 34.2). The continued cultivation of spelt into the Late Saxon period is further evidence of its value as a crop on these soils. The only crop that appears to have suffered on the clay was barley, which was present in smaller quantities than usual in most periods (apart from the Iron Age) and was absent from the Late Saxon and medieval samples. As a result, other fodder crops such as oats and cultivated vetch may have been more important.

CHARRED AND MINERALISED PLANT REMAINS FROM THE SG SITE

Methods

Excavations were carried out by Framework Archaeology during 2003 in advance of construction work on the SG site. During the excavations soil samples were taken from a range of features for the recovery of environmental information. The samples were processed by Framework staff using standard methods of floatation. A 250 micron mesh was used to recover the flot and a 0.5 mm mesh was used to retain the residue.

In September 2003 the dried flots (and several residues) from 22 samples were assessed by the author for charred and mineralised plant remains. This led to the further analysis of eight samples, comprising an Early Neolithic tree-throw, a Middle/Late Iron Age pit and four Late Saxon features. This report discusses the results of the analysis.

Results

Lists of plant taxa recorded in the samples are presented in Table 34.6 Nomenclature and most of the habitat information follows Stace (1997). Other texts consulted in order to characterise the assemblages were Ellenberg (1988) and Hill *et al.* (1999).

Discussion

The charred plant remains from the SG site were not particularly well-preserved or plentiful, but they provided a few significant pieces of economic information that can be added to the accumulating environmental evidence from the Stansted area (Murphy 2004; Carruthers 2007). The results are described below, feature by feature, and then discussed in the context of other excavations in the area.

Early Neolithic tree-throw, 496001 (sample 6330, context 496006)

Although 38 litres of soil was processed from this feature, the flot contained very little charcoal and frequent modern roots. Unfortunately, the few, poorly preserved fragments of charred plant remains recovered from the flot were thought to be of suspect origin, since they included several cultivated flax seeds (*Linum usitatissimum*). Cultivated flax has been recorded from Neolithic features on other sites, including accelerator-dated flax from a Neolithic timber hall at Balbridie, Grampian (Fairweather and Ralston 1993). However, the oily seeds of flax often become soft, distorted and fragile when charred, so their occurrence is fairly sporadic in early prehistoric deposits. Their distribution tends to be restricted to well-preserved, primary charred deposits (like the burnt down building at Balbridie) or waterlogged features (such as those at Perry Oaks, Heathrow, Carruthers, 2006). The recovery of a very large deposit of charred flax seeds (744 seeds) at Stansted Southgate from a Late Saxon posthole 80 metres north-west of the tree-throw seems to be too much of a coincidence. Flax seeds may well have spread from the posthole into a nearby Late Saxon cess pit, but are unlikely to have contaminated the tree-throw *c* 80 metres away by similar means. It is more likely that contamination occurred during sampling or sample processing. Accelerator dating of the flax seeds from the tree-throw feature confirmed suspicions that the remains were Late Saxon in date (NZA-25461: 780-900 ± 30 AD).

The cereal grains were too poorly preserved to be identified to a specific cereal type, although a small fragment of free-threshing wheat rachis (*Triticum* sp.) was present. Free threshing wheat was fairly well represented in a posthole at Balbridie (Fairweather and Ralston 1993), so its presence in a Neolithic feature at Southgate is not impossible. However, free-threshing rachis fragments tend to be rare in these types of assemblages, so suspicions were once again raised. Because contamination was confirmed for the flax, the few poorly preserved possible cereal grains in the feature must also remain suspect. Therefore, no reliable evidence for cereal cultivation was recovered for the Neolithic period on the SG site.

Middle/Late Iron Age pit 504011

Sample 6331 – A sample of domestic refuse from pit 504011 (context 54013), contained a couple of emmer/spelt spikelet forks (*Triticum dicocum/spelta*) and occasional cereal grains, including barley (*Hordeum* sp.) and emmer/spelt wheat. The only weed represented was black bindweed (*Fallopia convolvulus*). This sparse assemblage is typical of low-level general domestic waste found on many Early/Middle Iron Age sites. By the LIA most sites in southern England begin to produce higher concentrations of charred waste, indicating an increase in arable production (see discussion below).

Late Saxon features

Late Saxon ditch 499020

The fill of a Late Saxon enclosure ditch 499020 (context 500031) produced frequent, poorly preserved cereal grains which had the typical rounded profile and vacuolated state of preservation of bread-type wheat (*Triticum aestivum*-type). A single free-threshing wheat (includes bread and rivet wheat) rachis fragment was also present. No hulled wheat remains were recovered from the 20 litre soil sample, as might be expected. By the Saxon period free-threshing wheats (in particular, bread-type wheat) had become the principal cereal grown in southern England. Although bread wheat is easier to process, produces well-raised loaves and grows well on clay soils, it is demanding of nutrients and is more susceptible to predators and spoilage. These factors will have affected crop husbandry practices and methods of grain storage, although such changes are not easy to detect in the charred plant assemblages.

The few weed seeds that were present were fairly large, heavy seeds such as black bindweed and cleavers (*Galium aparine*), and these are more often present as contaminants of processed grain rather than the light fine weeds and chaff in crop processing waste. Their soil preferences are wide, providing little information about crop ecology, although the two cited examples are both climbers, twining and scrambling their way to the top of the crop where they would have been harvested with the ears. This, of course, does not rule out the possibility of harvesting low on the stalk, as low-growing weed seeds may have been lost during processing. The presence of several sedge nutlets (*Carex* spp.) indicated that some damp soils were being cultivated. Since several hazelnut shell (*Corylus avellana*) fragments were recovered from the M/LIA and four of the Late Saxon features, it appears that wild food resources were available and being exploited throughout the centuries.

Posthole 505008, context 505008, sample 6318

A 10 litre sample from this posthole in the north-west corner of the site produced 744 charred flax (*Linum usitatissimum*) seeds and numerous flax seed fragments. No cereals were present in the flot but 119 seeds of lady's bedstraw (*Galium verum*) were recorded. This non-climbing, yellow flowered relative of goosegrass may have been growing as a weed with the flax crop, although it is more typical of grassland and hedgebanks. The plant has a variety of uses; its flowers were once used to curdle milk, it has medicinal uses (eg a drug extracted from the plant prevents blood from clotting) and the leaves and root produce yellow and red dyes. It is tempting to suggest that its occurrence with the flax seeds indicates use for dyeing, though why the seeds should both become charred and concentrated in a posthole is less obvious. Flax seeds also have other uses, being a good source of oil (linseed) and an effective laxative. Although, today, breeding programmes have led to the production of strains that are more suitable for one or other purpose, in the past this useful crop is likely to have been grown for a variety of purposes. The association of the seeds with a posthole suggests that the remains could represent debris from the rippling process, where a bundle of flax plants, having been left to dry out and turn brittle, is hooked over a post and a special rake-like tool is used to 'comb' through the bundle to remove the dried leaves and seed capsules. If harvested with the flax, the lady's bedstraw seeds would also have been removed during this operation. Alternatively, a rippling post could have been used to prepare other plants for a variety of purposes. The presence of a single opium poppy seed (*Papaver somniferum*) hints at the range of other plants with medicinal uses that may have been prepared in this area. The fact that these seeds are charred could relate to extraction of oil from the seed, since heat is used prior to pressing the oil from the seeds. Alternately, the material could have burnt *in situ*, having fallen around the post into the top of the posthole. The remaining taxa from this feature consisted of a few hazelnut shell fragments, a sedge nutlet, grass seed and a stinking mayweed (*Anthemis cotula*) achene, representing general background waste.

Cess pit 498020

Samples from each of the three main fills of this pit were examined. The upper fill (context 498018, sample 6312) produced several poorly preserved charred cereal grains including bread-type wheat and some emmer/spelt wheat grains. The identification of the hulled wheats was backed up by the recovery of an emmer/spelt glume base. It is unusual, but not unprecedented, to find small quantities of hulled wheats still being grown in the Saxon period. A radiocarbon date on an emmer/spelt grain from a Late

Saxon beamslot on the MTCP site confirmed that hulled wheats (probably spelt) were still being grown in the Stansted area during AD 960-1040 ± 30 (NZA-23235).

Another crop plant that is more typical of the Saxon period is flax (*Linum usitatissimum*), and a few seeds and seed fragments were found in each of the three fills sampled. Because posthole 505008 is relatively close to this feature, the flax seeds had probably spread from the processing area into the cess pit. A radiocarbon date from an indeterminate wheat grain (*Triticum* sp.) in the lower fill, sample 6317, produced a modern date (NZA-25460), demonstrating that some intrusive material was present in the feature.

The middle fill (sample 6313) contained a smaller but similar range of domestic burnt waste and a trace of mineralised cereal bran. The lowest, primary fill, however (sample 6317), was the main source of mineralised remains, having been deposited as human faecal waste. This deposit, therefore, provides direct evidence of the Saxo-Norman diet. Of course, being a single feature it is not possible to know whether the dietary information can be taken as typical of all of the occupants of the site. However, as discussed below, very similar results were obtained from an early medieval cess pit on the MTCP site.

The mineralised faecal material suggested that a narrow range of foods was being consumed. The identifiable remains included frequent cereal bran fragments, some legume seed coat fragments including pea remains (*Pisum sativum*), and a few fruit seeds including apple/pear (*Malus sylvestris/Pyrus communis*) and brambles (*Rubus* sect. *Glandulosus*). The cereal bran was often present in concreted lumps of faecal material, and straw, hay or rush stems were often embedded in the concretions. Straw and hay had probably been used as toilet paper or to dampen smells. The small amount of charred material present may also have been deposited for this latter purpose. The charred seeds included a few cereal grains and weed seeds.

Pit 494014, context 494015, sample 6314

This charcoal-rich fill produced grains from all four cereals (wheat, barley, oats and rye), with the dominant cereal being free-threshing bread-type wheat. Just a trace of chaff was present, but weed seeds and other types of burnt waste were fairly common. The character of the assemblage was one of mixed domestic waste, perhaps originating from a domestic hearth. Thus, processed cereals and legumes (cf. pea, Celtic bean; *Vicia faba* var. *minor*) spilt during preparations from cooking, fruit stones (sloe; *Prunus spinosa*) and nutshells (*Corylus avellana*) tossed into the fire from snacks, materials used for tinder and fuel such as hay (spike-rush, grasses, small weed vetches) and animal bedding/fodder (cf. cultivated vetch; *Vicia sativa* cf. ssp. *sativa*) were all represented. Cultivated vetch was not positively identified, as important identifying characters (the hila) were not preserved. The seeds were of the typical size and shape (often squared, *c* 3.5 to 4.5 mm diameter) of cultivated vetch, and the frequency of the seeds suggested they represented a crop rather than weeds. Two larger, fatter and more rounded leguminous seeds (again with no identifying hila) were thought to have probably been peas (*Pisum sativum*) and two distinctively large and oval Celtic beans (*Vicia faba* var. *minor*) were positively identified. Together with the unidentifiable fragments of large legume, these remains demonstrate that legumes were an important part of the Late Saxon diet, particularly since these crops are less likely to become preserved by charring and so are usually under-represented in the archaeobotanical record.

Conclusions and comparisons with other sites

In view of the flax date from the Early Neolithic tree-throw, there is as yet no reliable evidence for cereal cultivation on the heavy, clay soils during the early prehistoric period from any of the Stansted, or Heathrow (Carruthers 2006) sites. Disturbance of the forest was probably limited to sporadic small clearings and transitory activities. The few charred cereal grains and hazelnut shell fragments from a pit on the MTCP site (A120, Carruthers 2007) were present in what was probably a ritual context, so they may have been grown on lighter soils elsewhere and brought into the area as an offering.

The single M/LIA sample indicated that low-level emmer/spelt wheat and barley cultivation may have been occurring by this period, although, again, the grain could have been brought onto the site rather than cultivated locally.

It is interesting to see that hazelnut shell fragments were present in five of the seven M/LIA and Late Saxon samples analysed. This relatively high occurrence matches the evidence from other Stansted sites. Surviving areas of woodland and hedgerows were clearly valued as a source of supplementary wild foods.

The archaeobotanical evidence from the Late Saxon period was a little more informative, being partly derived from mineralised faecal material as well as charred waste. The charred evidence was typical of the period, providing evidence for the cultivation of all four main cereals (bread-type wheat, barley, oats, rye), peas, beans, cultivated vetch (possibly) and flax. Native hedgerow fruits and nuts were being gathered (hazelnuts, sloes, apple/pear, blackberries) and some plants may have been grown as garden herbs (opium poppy) for culinary and medicinal purposes. Opium poppy (*Papaver somniferum*) seeds can also be used as a flavouring and are a source of oil. It is interesting to see how similar the results were from Southgate to those from an early medieval cess pit from another Stansted site (pit 310136, MTCP). Cereal and legume-based foods were again dominant, although on the MTCP site concretions containing mixed grain and legume testa (seed coat) fragments were common, whilst at Southgate these were not observed. This may represent the consumption a particular type of bread or pottage made with both cereal and pea/bean flour – a mixture which is said to be more common in a low status diet (Tannahill 1975). In addition, fruit seeds were much more frequent and varied on the MTCP site, including evidence for possible orchard crops including damson or bullace. Bramble seeds were particularly frequent, perhaps reflecting seasonal differences in diet. Of course, brambles can easily be preserved for use throughout the year, but their ready availability in woodland margins, scrub and hedgerows during autumn makes consumption more likely at this time of year. Opium poppy was being grown by the occupants of both sites.

The suggested Late Saxon diet, therefore, was a fairly simple one of mainly cereal based foods such as bread and legumes, perhaps cooked with meat as a pottage. These staples were supplemented by fruits and nuts gathered from the hedgerows such as apples, blackberries and hazelnuts. A few easily-grown imported herbs may have been cultivated in gardens for medicinal purposes, such as opium poppy. In the more urban Mid-Saxon site at St Mary's Stadium, Southampton (Carruthers 2005) similar results were obtained from a much greater number of cess pits (at least 13 pits), with the addition of only a few, scarce luxury foods such as coriander, cf. dill, cf. fennel and grape. It should be remembered that the chances of recovering some foods in an identifiable state is fairly small, for example leaf vegetables, so the mineralised evidence, although more direct than charred evidence, still provides only part of the story. Luxury foods eaten on a very sporadic basis are less likely to be recovered, particularly if they were ground into powders, as in the case of many spices. However, fruits such as figs and grapes are commonly recovered from earlier (Roman) and later (medieval) cess pits, so their absence from the Stansted sites is significant. It is clear that, in comparison, the Saxon diet was fairly simple and strongly biased towards cereals, legumes and native fruits and nuts. This appears to have been a common story for sites in southern England.

Table 34.1: The MTCP site

KEY: Remains charred unless in [ ] brackets= mineralised; > more than (too numerous to count, estimated number) ; + = counted up to this number but fragments of < ½ seed not included
Rough estimates + = present; ++ = several; +++ = frequent; ++++ = numerous
Feature types : D = ditch; DT = ditch terminus; P = pit; PH = posthole
Habitat Preferences : A = arable; C = cultivated; D = distubed/waste; E = heath; G = grassland; H = hedgerow; M = marsh/bog; R = rivers/ditches/ponds; S = scrub; W = woods; Y = waysides/hedgerows; a = acidic soils; c = calcareous soils; n = nutrient-rich soils; o = open ground; d = damp soils; * = plant of economic value

Sample Context	2670 353012 353011	2241 322018 322014	2407 334016 334013	2408 334014 334013	2409 334015 334013	2434 319139 319140	2516 330146 330145	2520 347046 347041
phase	Neo	MBA	R	R	R	R	R	R
Taxa Feature type	P	P	P	P	P	P	P	P
Cereals :								
Triticum aestivum-type (bread-type free threshing wheat grain)	1			Cf.1	Cf.3	Cf.1	3	Cf.4
Triticum dicoccum/spelta (emmer/spelt wheat grain)			51	430	325	>500	297	322
Triticum sp. (wheat grain NFI)				3		3	60	
Hordeum vulgare L. emend. (hulled barley grain)								
Hordeum sp. (indeterminate barley grain)								
Secale cereale L. (rye grain)					cf.1	23		4
Avena sp. (wild/cultivated oat grain)						4		5
Avena/Bromus sp. (oat/chess grain)				3	1		2	1
Indeterminate cereal grain	2	8	117+	671+	249+	>500	342	>500
Chaff :								
Triticum sp. (free-threshing wheat rachis frag.)								
Triticum spelta L. (spelt glume base)		1			3	23	44	>500
Triticum spelta L. (spelt spikelet fork)						1	5	>100
Triticum spelta L. (spelt rachis frag.)						1		
Triticum dicoccum Schübl. (emmer glume base)		1				cf.1		
Triticum dicoccum Schübl. (emmer spikelet fork)								cf.1
Triticum dicoccum / spelta (emmer / spelt glume base)		11	11+	30	38	135	114	>500
Triticum dicoccum / spelta (emmer / spelt spikelet fork)		7	1+	70	27	104	118	>100
Triticum dicoccum / spelta (emmer / spelt rachis frag.)								+
Avena sp (oat awn frag.)		+			+			+
Cereal sprout					+	++		++
Cereal-sized culm node							1	8
Cereal-sized culm base								
Weeds :								
Ranunculus repens/acris/bulbosus (buttercup achene) DG							2	2
Corylus avellana L. (hazel nut shell frag.) HSW*	103							
Polygonum aviculare L. (knotgrass achene) CD							1	
Fallopia convolvulus (L.) A.Love (black-bindweed achene) AD							2	
Rumex acetosella L. (sheep's sorrel achene) CEGas						1		
Rumex sp. (dock achene) CDG				1	2	4	10	4
Vicia/Lathyrus sp. (<=2mm, small seeded weed vetch/tare) CDG							1	
Vicia/Lathyrus sp. (>.2mm, small seeded weed vetch/tare) CDG		1			1			

Vicia faba var. *minor* (Celtic bean) *								
Trifolium/Lotus sp. (clover/trefoil) DG								
Daucus carota L. (wild carrot mericarp) Gc*								cf.1
Plantago laceolata L.(ribwort plantain) Go								
Odontites vernus/Euphrasia sp. (red bartsia/eyebright) ADGY								
Sherardia arvensis L. (field madder nutlet) ADG								
Galium aparine L. (cleavers nutlet) CDH		1						1
Cirsium/Carduus sp. (thistle achene) ADG								
Anthemis cotula L. (stinking chamomile achene) ADhw								1
Eleocharis subg. *Palustres* (spike-rush nutlet) MPw							2	1
Carex sp. (trigonous sedge nutlet) MPw					1	2	1	2
Carex sp. (lenticular sedge nutlet) MPw		1				2		
Bromus sect. *Bromus* (chess caryopsis) ADG						cf.1		1
Poaceae *Poa*-type (small seeded grass caryopsis) CDG								1
Poaceae *Lolium*-type (long seeded grass caryopsis) CDG								
Grass-sized culm fragments						+++		
Sparganium erectum L. (branched bur-reed fruit) MPw								
Total charred remains:	106	31	180+	1209+	651+	>1306	1005	>2059
Sample size:	40	40	40	40	40	40	15	40
Fragments per litre:			4.5+		16.3+		67	

Table 34.1 (contd.): BAAMP00/MTC

Sample Context Feature	2709 319313 319313	2425 338015 338022	2428 337019 333072	2436 319148 319149	2437 319150 319151	2438 319153 319154	2439 319158 319159
phase	R	LR	LR	LR	LR	LR	LR
Taxa Feature type	D	K	D	G	G	G	G
Cereals :							
Triticum aestivum-type (bread-type free threshing wheat grain)		cf.1	1		cf.1		Cf.10
Tritium monococcum/dicoccum (einkorn/emmer grain)			1				
Triticum dicoccum/spelta (emmer/spelt wheat grain)	257	54	>500	47	95	18	>500
Triticum dicoccum/spelta (emmer/spelt wheat grain - sprouted)			++		++		
Triticum sp. (indeterminate wheat grain)	2	2		2			
Hordeum vulgare L. emend. (hulled barley grain)			3				
Hordeum sp. (indeterminate barley grain)	3		4				2
Secale cereale L. (rye grain)							
Avena sp. (wild/cultivated oat grain)	2		Cf.1		4		
Avena/Bromus sp. (oat/chess grain)				2			
Indeterminate cereal	>500	212+	>500	205	191	37	>500
Chaff :							
Triticum sp. (free-threshing wheat rachis frag.)							
Triticum spelta L. (spelt glume base)	3	28	>500	68	181	10	23
Triticum spelta L. (spelt spikelet fork)	1		>100	1	2		

Triticum spelta L. (spelt rachis frag)			+	1	1		1
Triticum dicoccum Schübl. (emmer glume base)	1		4				
Triticum dicoccum Schübl. (emmer spikelet fork)	1						
Triticum dicoccum / spelta (emmer / spelt glume base)	19	177	>500	>500	>500	107+	52+
Triticum dicoccum / spelta (emmer / spelt spikelet fork)	5	25	>100	>100	>100	33+	7+
Triticum dicoccum / spelta (emmer / spelt rachis frag.)		1					
Avena sp (oat awn frag.)	+	++	+++		+++	+	+
Detached cereal sprout			++		+++	+	
Cereal-sized culm node	3		1		1		
Cereal-sized culm base	1						
Weeds :							
Ranunculus repens/acris/bulbosus (buttercup achene) DG	2			2	1	1	1
Corylus avellana L. (hazel nut shell frag.) HSW*	37	1			1		
Montia fontana ssp. *chondrosperma* (Fenzl) Walters (blinks seed) GPw	1						
Polygonum aviculare L. (knotgrass achene) CD	1						
Fallopia convolvulus (L.) A.Love (black-bindweed achene) AD	1		11	1	2		
Rumex acetosella L. (sheep's sorrel achene) CEGas							
Rumex sp. (dock achene) CDG	64	1	63	4	10	3	6
Viola sp. (violet seed) DGH	1						
Punus spinosa L. (sloe stone) HSW*	2						
Rosaceae thorn (sloe/hawthorn-type thorn)	1						
Vicia/Lathyrus sp. (<=2mm, small seeded weed vetch/tare) CDG	10	1					1
Vicia/Lathyrus sp. (>.2mm, small seeded weed vetch/tare) CDG	1						
Pisum sativum L. (pea) *		cf.2					
Large legume frag. (pea/bean/vetch) DG*		1					
Trifolium/Lotus sp. (clover/trefoil seed) DG	4						
Daucus carota L. (wild carrot mericarp) Gc*	cf.1		cf.2				
Prunella vulgaris L. (self-heal nutlet) DG	2						
Plantago laceolata L.(ribwort plantain) Go							
Odontites vernus/Euphrasia sp. (red bartsia/eyebright) ADGY	14		3				
Sherardia arvensis L. (field madder nutlet) ADG	9						
Galium aparine L. (cleavers nutlet) CDH			1				
Galium sp. (cleaver nutlet frag)	1						
Valerianella dentata (L.)Pollich. (narrow-fruited cornsalad fruit) AD	3						
Cirsium/Carduus sp. (thistle achene) CDGH	1		1				
Anthemis cotula L. (stinking chamomile achene) ADhw		1	2	1	2		
Tripleurospermum inodorum (L.)Sch.Bip. (scentless mayweed achene) CD	1		1				
Eleocharis subg. *Palustres* (spike-rush nutlet) MPd							
Carex sp. (trigonous sedge nutlet) MPd	6						
Carex sp. (lenticular sedge nutlet) MPd	1		1				
Danthonia decumbens (L.)DC (heath-grass caryopsis) EGas	1						
Bromus sect. *Bromus* (chess caryopsis) ADG	7	1	1		2	1	
Poaceae *Poa*-type (small seeded grass caryopsis) CDG	6		8			1	
Poaceae *Lolium*-type (long seeded grass caryopsis) CDG							

Arrhenatherum elatius var. *tuberosum* (Willid.)St Amans (onion couch tuber) CDG	4						
Grass-sized culm frags	+						
Mineralized worm cocoon	[1]						
Total charred remains:	>981	508+	>2309	>934	>1094	211+	>1103
Sample size:	27	30	40	20	37	24	40
Fragments per litre:	>36.3	16.9+	>57.7	>46.7	>29.6	8.8+	

Table 34.1 (contd.): BAAMP00/MTC

Sample Context Feature	2004 309032 302020	2005 309033 302020	2019 315009 302020	2068 307012 302020	2737 310139 310136	2738 310140 310136	2741 366004 366001	2211 322008 322007	2212 315052 315051
phase	EM	EM	EM	EM	EM	EM	M	?M	M
Taxa Feature type	B	B	B	B	P	P	P	P	P
Cereals :									
Triticum aestivum-type (bread-type free threshing wheat grain)	7	10	4		Cf.5	1	22	510	202
Triticum dicoccum/spelta (emmer/spelt wheat grain)			11						
Triticum sp. (wheat grain NFI)					1				
Hordeum vulgare (hulled barley grain)									
Secale cereale L. (rye grain)		cf.2	cf.1			cf.[3]		7	
Avena sp. (wild/cultivated oat grain)	154	357	6	129				11	1
Avena/Bromus sp. (oat/chess grain)				3				3	
Indeterminate cereals	236	384	44	6	6		6	583	139
Chaff :									
Triticum aestivum-type (bread-type wheat rachis frag.)								2	
Triticum turgidum-type (rivet-type wheat rachis)								2	
Triticum sp. (free-threshing wheat rachis frag.)			1				6	16	4
Triticum dicoccum / spelta (emmer / spelt glume base)			1						
Avena sp (oat awn frag.)			+						
Cereal bran fragments					[+++]	[+++]			
Cereal-sized culm node							20	3	1
Cereal-sized culm base							5	1	
Straw/rush/sedge stem fragments					[+]	[+++]			
Weeds :									
Ranunculus repens/acris/bulbosus (buttercup achene) DG		3	1			[3]		2	
Papaver somniferum L. (opium poppy					[1]				

seed) D*									
Urtica dioica L. (stinging nettle achene) CDn						[1]			
Corylus avellana L. (hazel nut shell frag.) HSW*	1	5	1		2			3	1
Atriplex patula/prostrata (orache seed) CDn							43		
Chenopodiaceae embryo						[6]	5		
Polygonum aviculare L. (knotgrass achene) CD						[1]	54		
Fallopia convolvulus (L.) A.Love (black-bindweed achene) AD				1			14		
Rumex sp. (dock achene) CDG		1	1	5	[1]	[16]	7		1
Brassica/Sinapis sp. (mustard, charlock etc. seed) CD*					[1]	[1]			
Rubus sect. *Glandulosus* (bramble seed) HSW*					[299]	[32]		1	
Rubus sp. (bramble/raspberry embryo) HSW*						[51]			
Malus sylvestris (L.)Mill. (crab apple seed) HSW*					[1]				
Malus/Pyrus sp. (apple/pear embryo) HSW*					[2]	[14]			
Potentilla/Fragaria vesca (tormentil/strawberry embryo) GH*						[2]			
Prunus domestica cf. ssp. institia (cf. damson, bullace embryo) *HSW					[23]	[11]			
Prunus avium/spinosa L. (cherry/sloe embryo) HSW*					[6]	[14]			
Prunus sp. (cherry/sloe/plum/damson seed fragment) HSW*					[11]	[15]			
Vicia/Lathyrus sp. (<=2mm, small seeded weed vetch/tare) CDG	2	6		6	1			1	
Vicia/Lathyrus sp. (>.2mm, small seeded weed vetch/tare) CDG								13	1
Vicia faba var *minor* L. (whole Celtic bean) *								6	
Vicia faba L. (bean hilum & testa fragment)					[1]				
Pisum sativum L. (whole pea) *						[1]			
Pisum sativum L. (pea hilum & testa fragment) *						[3]			
Legume (pea/bean) testa frags					[++]	[+++]			
Legume testa & cereal bran fragments concreted together					[5]	[30]			

Vicia/Pisum sp. (large legume frag)								10	
Legume pod fragment								1	
Trifolium/Lotus sp. (clover/trefoil) DG							2		
Aethusa cynapium L. (fool's parsley mericarp) CD						[1]	3		
Scandix pecten-veneris L. (shepherd's needle mericarp) AD							7		
Galeopsis tetrahit L. (common hemp-nettle nutlet) ADWod							1		
Stachys sylvatica L. (hedge woundwort nutlet) DHW							2		
Odontites vernus/Euphrasia sp. (red bartsia/eyebright) ADGY							12	1	
Galium aparine L. (cleavers) CDH	3	1	1						
Sambucus nigra L. (elderberry seed) HSWn							1		
Cirsium/Carduus sp. (thistle achene) CDG						[2]	1		
Anthemis cotula L. (stinking chamomile achene) ADhw					3		38	1	
Lapsana communis L. (nipplewort achene) CDH				1					
Asteraceae embryo						[1]			
Eleocharis subg. *Palustres* (spike-rush nutlet) MPd	1								

Table 34.1 (contd.): BAAMP00/MTC

Sample Context Feature	2004 309032 302020	2005 309033 302020	2019 315009 302020	2068 307012 302020	2737 310139 310136	2738 310140 310136	2741 366004 366001	2211 322008 322007	2212 315052 315051
phase	EM	EM	EM	EM	EM	EM	M	?M	M
Taxa Feature type	B	B	B	B	P	P	P	P	P
Sparganium erectum L. (branched bur-reed fruit) PMw	1	1							
Carex sp. (trigonous sedge nutlet) MPw			1		[7]		8	2	
Carex sp. (lenticular sedge nutlet) MPw	1	1							
Bromus sect. *Bromus* (chess caryopsis) ADG	9	14		6		[4]		13	4
Poaceae various (small seeded grass caryopsis) CDG						[7]	4	1	
Worm cocoon					[2]	[2]			
Nodule					[2]				
Insect/Arthropod frags						[+++]			
Total charred remains:	415	785	73	157	18[362]	1[221]	262	1193	354
Sample size:	20	10	37	20	40	23	30	32	40
Fragments per litre:	20.8	78.5	2.0	7.9	9.5	9.7	8.7	37.3	8.9

Table 34.2: The M11 site

Sample Context Feature	6140 423050 423049	6211 436092 436091	6117 430019 430039	6131 439014 439013
phase	MBA	EIA	M/LIA	LIA
Taxa Feature type	P	P	RG	D
Cereals :				
Triticum dicoccum/spelta (emmer/spelt wheat grain)	10	6	89	40
Triticum sp. (indeterminate wheat grain)			1	
Hordeum vulgare L. emend. (hulled barley grain)			4	
Hordeum sp. (indeterminate barley grain)	1	5	19	4
Avena sp. (wild/cultivated oat grain)	cf.1		9	
Avena/Bromus sp. (oat/chess grain)	4		17	
Indeterminate cereals	60	11	>500	99
Chaff :				
Triticum spelta L. (spelt glume base)				6
Triticum spelta L. (spelt spikelet fork)	1			1
Triticum dicoccum Schübl. (emmer glume base)	1			12
Triticum dicoccum Schübl (emmer spikelet fork)				9
Triticum dicoccum / spelta (emmer / spelt glume base)	3	1	2	46
Triticum dicoccum / spelta (emmer / spelt spikelet fork)	20	1	4	31
*Hordeu*m sp. (barley rachis frag.)			4	1
Avena sp (oat awn frag.)	++		++	++
Weeds :				
Corylus avellana L. (hazel nut shell frag.) HSW*	5	3	13	
Chenopodium album L. (fat hen seed) CDn			9	
Montia fontana ssp. *chondrosperma* (Fenzl) Walters (blinks seed) GPw		1	1	
Persicaria maculosa/lapathifolia (redshank/pale persicaria achene) CDo			10	
Polygonum aviculare L. (knotgrass achene) CD			1	
Fallopia convolvulus (L.) A.Love (black-bindweed achene) AD	1		3	
Rumex acetosella L. (sheep's sorrel achene) CEGas			2	
Rumex sp. (dock achene) CDG			29	4
Thlaspi arvense L. (field penny-cress seed) AD				1
Vicia/Lathyrus sp. (<=2mm, small seeded weed vetch/tare) CDG	3		33	
Vicia/Lathyrus sp. (>.2mm, small seeded weed vetch/tare) CDG	2			
Trifolium/Lotus sp. (clover/trefoil seed) DG			3	
cf. *Aethusa cynapium* L. (fool's parsley mericarp) CD			1	
Prunella vulgaris L. (self-heal nutlet) DG				1
Galeopsis tetrahit L. (common hemp-nettle nutlet) ADWod			1	
Plantago laceolata L.(ribwort plantain) Go			4	
Odontites vernus/Euphrasia sp. (red bartsia/eyebright) ADGY	3		7	
Galium aparine L. (cleavers) CDH	27	3		
Valerianella dentata (L.)Pollich. (narrow-fruited cornsalad fruit) AD	1		2	
Lapsana communis L. (nipplewort achene) CDH	Cf.1			
Tripleurospermum inodorum (L.)Sch.Bip. (scentless mayweed achene) CD			1	3
Asteraeae embryos				3
Eleocharis subg. *Palustres* (spike-rush nutlet) MPw			1	
Carex sp. (trigonous sedge nutlet) MPw			1	
Bromus sect. *Bromus* (chess caryopsis) ADG			22	1
Poaceae *Poa*-type (small seeded grass caryopsis) CDG	1		18	
Poaceae *Lolium*-type (long seeded grass caryopsis) CDG			cf.2	
Total charred remains:	145	31	>813	262
Sample size:	40	30	(50%) 31	5
Fragments per litre:	3.6	1.0	>52.5	52.4

Table 34.3: The LTCP and LBR sites

Sample Context Feature	476 107067 109169	297 138015 109212	324 150003 102071	371 136013 136045	258 129025 109214	296 129032 109214	LBR 4013 207021 207013
phase	LIA	LIA/ER	LIA/ER	LIA/ER	ER	ER	R
Taxa Feature type	D	D	D	P	D	D	D
Cereals :							
Triticum aestivum-type (bread-type free threshing wheat grain)				cf.8	5	1	3
Triticum compactum-type (compact-type free threshing wheat grain)					1	5	
Triticum dicoccum/spelta (emmer/spelt wheat grain)	18	34	92	151	>500	132	>500
Triticum sp. (indeterminate wheat grain)			2	10			
Hordeum vulgare L. emend. (hulled barley grain)		8	5		11	5	
Hordeum sp. (indeterminate barley grain)	16	4	14	1		4	1
Secale cereale L. (rye grain)					cf.3		Cf.3
Avena sp. (wild/cultivated oat grain)		cf.2	1 & cf2	2	2		Cf.2
Avena/Bromus sp. (oat/chess grain)	1		26	7	27	8	2
Indeterminate cereals	49	75	280+	54	>500	149	>500
Chaff :							
Triticum sp. (free-threshing wheat rachis frag.)			1		2	2	1
Triticum spelta L. (spelt glume base)	1	1	38	1	271	55	>500
Triticum spelta L. (spelt spikelet fork)					6	2	>100
Triticum spelta L. (spelt rachis frag.)					8	2	
Triticum dicoccum Schübl. (emmer glume base)	1					Cf.1	Cf.8
Triticum dicoccum / spelta (emmer / spelt glume base)	16	7	92	12	72	63	>500
Triticum dicoccum / spelta (emmer / spelt spikelet fork)	10	4	12		39	25	>100
Triticum dicoccum / spelta (emmer / spelt rachis frag.)			1		2	1	
Hordeum sp. (barley rachis frag)			1		2	19	
Avena sp (oat awn frag.)		++	+++			+	
Detached cereal sprout					+	+	+
Cereal-sized culm node	6				11	1	+
Cereal-sized culm base	2				8	1	
Weeds :							
Ranunculus repens/acris/bulbosus (buttercup achene) DG	1		1	3	5	1	
Ranunculus parviflorus L. (small-flowered buttercup achene) o					1	2	
Corylus avellana L. (hazel nut shell frag.) HSW*		18	1		17	1	
Chenopodium album L. (fat hen seed) CDn			2		3		
C. polyspermum L. (many-seeded goosefoot seed) CD							3
Atriplex patula/prostrata (orache seed) CDn					2		8
Montia fontana ssp. *chondrosperma* (Fenzl) Walters (blinks seed) GPw		1	1	2	10	4	
Agrostemma githago L. (corn cockle, capsule frag.) AD					7	3	
Stellaria media (L.)Vill. (common chickweed seed) Con		3		1	1	1	
S. graminea L. (lesser stitchwort seed) Gd					1		
Lychnis flos-cuculi L. (ragged-robin seed) GMw		1					
Polygonum aviculare L. (knotgrass achene) CD			9	3	33	1	3
Persicaria maculosa/lapathifolia (redshank/pale persicaria achene) CDo	1						
Fallopia convolvulus (L.) A.Love (black-bindweed achene) AD		2	1	1	2		38
Rumex acetosella L. (sheep's sorrel achene) CEGas			2	3	19	7	3
Rumex sp. (dock achene) CDG	1	13	26	7	69	15	155
Viola sp. (violet seed) DGH							cf.1
Crataegus monogyna Jacq. (hawthorn stone frag.) HSW*					2		
Prunus spinosa L. (sloe stone) HSW*					1	1a	
Rosa sp. (rose stone) HSW*						1	
Pisum sativum L. (pea) *					5	cf.1	
Vicia/Lathyrus sp. (<=2mm, small seeded weed vetch/tare) CDG	7	29	24	2	31	74	1
Vicia/Lathyrus sp. (>.2mm, small seeded weed vetch/tare) CDG					28	6	
Trifolium/Lotus sp. (clover/trefoil seed) DG			1	9	17	20	1

Legume pod fragment						1	
Linum usitatissimum L. (cultivated flax seed) *					1		
Conium maculatum L. (hemlock mericarp) GDw						Cf.1	
Daucus carota L. (wild carrot mericarp) Gc*					3		
Hyoscyamus niger L. (henbane seed) Dn					2		
Lithospermum arvense L. (field gromwell seed) AD				5			
Plantago lanceolata L.(plantain seed) Go			1	1			
Odontites vernus/Euphrasia sp. (red bartsia/eyebright) ADGY			7	9	1	23	
Rhinanthus sp. (yellow-rattle seed) ADG				3	5		
Sherardia arvensis L. (field madder nutlet) ADG		1	1		4	3	
Galium aparine L. (cleavers nutlet) CDH	2			4	5	5	
G. verum L. (lady's bedstraw nutlet) Gcd					1		
Valerianella dentata (L.)Pollich. (narrow-fruited cornsalad fruit) AD		1		2		7	
Lapsana communis L. (nipplewort achene) CDH					1		
Centaurea sp. (knapweed achene) ADG							1 & 5f
Picris sp. (oxtongue achene) CDoc							Cf.1
Anthemis cotula L. (stinking chamomile achene) ADhw							3

Sample Context Feature	476 107067 109169	297 138015 109212	324 150003 102071	371 136013 136045	258 129025 109214	296 129032 109214	LBR 4013 207021 207013
phase	LIA	LIA/ER	LIA/ER	LIA/ER	ER	ER	R
Taxa (contd.) Feature type	D	D	D	P	D	D	D
Leucanthemum vulgare Lam. (oxeye daisy achene) Gn					2		
Tripleurospermum inodorum (L.)Sch.Bip. (scentless mayweed achene) CD		4	2	33	12	20	2
Eleocharis subg. *Palustres* (spike-rush nutlet) MPw		3	1	10	1	1	
Carex sp. (trigonous sedge nutlet) MPw			5	8	7	4	
Carex sp. (lenticular sedge nutlet) MPw			1	3	4	1	
Arrhenatherum elatius var. *tuberosum* (Willid.)St Amans (onion couch tuber) CDG				1	2		
Bromus sect. *Bromus* (chess caryopsis) ADG	30	1	34	32	119	41	12
Danthonia decumbens (L.)DC (heath-grass caryopsis) EGas			1		1		
Poaceae *Poa*-type (small seeded grass caryopsis) CDG			16	6	16	11	24
Poaceae *Lolium*-type (long seeded grass caryopsis) CDG		1	2	59	119	36	42
? Liliaceae					1		
Total charred remains:	162	213	706+	453	>2031	768	2523
Sample size:	12	40	40	35	40	40	36
Fragments per litre:	13.5	5.3	17.7+	12.9	>50	19.2	70.1

Table 34.4: The LTCP phase 3 hunting lodge

Sample	840	841	920
Context	467028	467030	461027
Feature	459026	467032	461038
phase	PM	PM	PM
Taxa Feature type	H	H	W
Cereals :			
Triticum aestivum/turgidum –type (bread/rivet-type free threshing wheat grain)	699	3	19
Hordeum vulgare L.emend. (hulled barley grain)	42		15
Secale cereale L. (rye grain)	3		
Triticum/Secale cereale (wheat/rye grain)			2
Avena sp. (wild/cultivated oat grain)	3	cf.1	7
Avena/Bromus sp. (oat/chess grain)	2		
Indeterminate cereals	265	4	71
Chaff :			
Triticum aestivum-type (bread-type wheat rachis frag.)	3	1	
T. turgidum-type (rivet-type wheat rachis frag.)	3		23
cf. *T. turgidum*-type (cf. rivet-type wheat rachis frag.)	21		
Triticum sp. (free-threshing wheat rachis frag.)	380		89
Hordeum sp. (barley rachis frag)	15		
Secale cereale L. (rye rachis frag.)	5		
Cereal-sized culm node	4		4
Cereal-sized culm base	2		
Weeds :			
Polygonum aviculare L. (knotgrass achene) CD	1		
Vicia/Lathyrus sp. (<=2mm, small seeded weed vetch/tare) CDG	11		
Vicia/Lathyrus sp. (>.2mm, small seeded weed vetch/tare) CDG	1		
Vicia faba (Celtic/broad bean frag.) *			1
Pisum sativum L. (pea) *	1	cf.2	
Trifolium/Lotus sp. (clover/trefoil seed) DG			1
Anthemis cotula L. (stinking chamomile achene) ADhw	2		10
Lolium temulentum (darnel caryopsis)		1	
Total charred remains:	1463	12	242
Sample size (litres soil):	40	40	1
Fragments per litre:	36.6	0.3	242

KEY
Feature type: B = beamslot; D = ditch; G = gully; H = hearth; K = kiln; P = pit; RG = ring gully; W = well
Habitat preferences: * = cultivated plant; A = arable; C = cultivated; D = disturbed/waste ground; E = heath; G = grassland; H = hedgerow; M = marsh/bog; P = ponds/ditches/rivers; S = scrub; W = woodland; Y = waysides
Soil preferences: a = acidic; c = calcareous; d = dry; o = open; s = sandy; w = damp/wet
+ = occasional; ++ = several; +++ = frequent; ++++ = numerous
[ ] = mineralized; no brackets = charred
cf. = uncertain identification

Table 34.5: The waterlogged plant remains

Site	MTCP BAAMP00	MTCP BAAMP00	MTCP BAAMP00	M11 BAALR00	LTCP BAACP01	LTCP BAACP01
Sample	**2677/2684**	**2677/2685**	**2677/2687**	**6223**	**909**	**921**
Context	**316123**	**316123**	**316120**	**431042**	**464037**	**461035**
depth	**0.47m**		**0.63m**			
Feature type	**RD**	**RD**	**RD**	**430084**	**pit**	**well**
Phase **Taxa**	**BA**	**BA**	**BA**	**LBA**	**PM**	**PM**
cf. *Triticum dicoccum/spelta* (cf. emmer/spelt glume base) *				1		
Ranunculus acris/bulbosus/repens (buttercup achene) DG		3		10	34	6
R. subg. *Batrachium* (crowfoot achenes) BP	256	>500	29	70	4	1
R. sceleratus L. (celery-leaved buttercup achene) MP					2	
Humulus lupulus L. (hop achene) HSF*					1	
Urtica dioica L. (stinging nettle achene) CDn	10	22	7	>500	14	51
Urtica urens L. (small nettle achene) CDn						5
Alnus glutinosa L. (alder seed) WSF			1			
Chenopodium bonus-henricus L. (Good King Henry seed) WGn						1
Chenopodium album L. (fat-hen seed) CDn				13	7	1
C. polyspermum L. (many-seeded goosefoot seed) CD				5		
Atriplex patula/prostrata (orache seed) CDn				3	8	
Moehringia trinervia (L.)Clairv. (three-nerved sandwort seed) HW				20		
Agrostemma githago L. (corn cockle seed) A						1f
Stellaria media (L.) Villars (common chickweed seed) CD				80	4	
S. graminea L. (lesser stitchwort seed) Gd				1		3
Silene vulgaris Garke (bladder campion seed) DGo					1	
Fallopia convolvulus (L.)A.Love (black bindweed achene) CD					1	1
Rumex acetosella L. (sheep's sorrel achene) GECas					2	
R. conglomeratus Murray (clustered dock achene) woBP					3	
Rumex sp. (dock achene) CDG	3	25	1	69	26	3
Persicaria lapathifolia (L.)Gray (pale persicaria achene) CDd				1	1	1
Persicaria maculosa Gray (redshank nutlet) CDo				1	1	
Polygonum aviculare (knotgrass achene) CD				3	7	6
P. hydropiper (L.)Spach (water-pepper achene) Pwh					5	
Viola sp. (violet seed) GHW	5	1	1		1	
Alliaria pertiolata (M.Bieb.)Cavara & Grande (garlic mustard seed) DHy				1		
Raphanus raphanistrum L. (wild radish seed) CD						6
Raphanus raphanistrum L. (wild radish capsule frag.) CD						1
Rubus sect. *Glandulosus* (bramble seed) DHSW*	6	6		14	1	
Potentilla cf. *reptans* L. (cf. creeping cinquefoil achene) DHGo					87	
Potentilla sp. (cinquefoil achene) DGMY	1		4			
Agrimonia eupatoria L. (agrimony achene) GH						1
Rosa sp. (rose seed) HSW				2		
Rosa /Rubus sp. (rose/bramble type thorn) HSW		2		7	+	++
Prunus domestica ssp. *inititia* (L.)Bonnier & Layens (bullace/damson stone) *						3
Prunus sp. (sloe stone fragments) HSW			1	1		2f
Prunus/Crataegus sp. (sloe /hawthorn type thorn) HSW		1		3	+	++
Crataegus monogyna Jacq. (hawthorn fruit stone) HSW		1		6&5f		4i
Pisum sativum L. (garden pea frag.) *						1f
Medicago lupulina L. (black medick fruit) GD						1
Cornus sanguinea L. (dogwood seed) HSWl				2		

cf. *Buxus sempervirens* L. (cf. box leaf) WSHc						1
Frangula alnus Mill. (alder buckthorn seed frag.) MSWo				1&2f		
Vitis vinifera L. (grape pip) *						2
Linum usitatissimum (cultivated flax capsule frags) *				3		
Linum catharticum L. (fairy flax seed) Gcs			1			
Acer sp. (maple key frag.) HSW	Cf.1			1		
Aethusa cynapium L. (fool's parsley mericarp) CD				3		
Apium nodoflorum (L.)Lag. (fool's watercress mericarp) MPw					6	
Umbellifer cf. *Bupleurum rotundiflorum* L. (cf. thorow-wax mericarp) Ac						1
Conium maculatum L. (hemlock mericarp) DPYw						3
Daucus carota L. (wild carrot mericarp) Gc*	1	1		cf.1 & {1}		1
Chaerophyllum temulum L. (rough chrvil mericarp) GHWo				6		1
Anthriscus sylvestris (L.)Hoffm. (cow parsley mericarp) GHWo						141
Scandix pecten-veneris L. (shepherd's needle mericarp) AD						4
Lycopus europaeus L. (gypsywort nutlet) FGwPB	14	14	3		4	
Prunella vulgaris L. (selfheal nutlet) GDWo		1	1	1	6	
Ballota nigra L. (black horehound nutlet) HYD		2				
Lamium sp. (dead-nettle nutlet) CDY				3		
cf.*Marrubium vulgare* L. (cf. white horehound nutlet) GDo	2		1			
Galeopsis tetrahit L. (common hemp-nettle nutlet) ADWod				3	1	
Stachys sp. (woundwort nutlet) GHEWM	1			2		1
Mentha sp. (mint nutlet) GBM	58	33	3		4	1
Callitriche sp. (water-starwort fruit) P	1	2	3	10		
Plantago laceolata L.(ribwort plantain seed) Go				3	6	2
Hypericum sp.(St John's wort seed) G	2	6				
Sambucus nigra L. (elder seed) DHSW	16	5		10		
Valerianella dentata (L.) Pollich (narrow-fruited corn-salad seed) AD						1
Valeriana dioica L. (marsh valerian fruit) MF					1	
Bidens cernua L. (nodding bur-marigold achene) PM		2				
Bidens sp. (bur-marigold achene) PM		2				
Arctium lappa L. (greater burdock achene) DWoY					cf.1f	1
Carduus/Cirsium sp. (thistle achene) GDY	3	3	2	2	4	
Lapsana communis L. (nipplewort achene) DHWo				2	1	1
Leontodon autumnalis L. (autumn hawkbit achene) G		1			1	
Picris echioides L. (bristly oxtongue achene) Dc						1
Sonchus oleraceus L. (smooth sow-thistle achene) CDY						1
Sonchus asper (L.)Hill (prickly sow-thistle achene) CDY				1	3	
Anthemis cotula L. (stinking mayweed achene) ADhd					13	7
Taraxacum sp. (dandelion achene) CDG				1		
Alisma plantago-aquatica L. (water plantain achene) P		20			6	
Arum maculatum L. (lords and ladies seed) HWc				cf.1		
Lemna sp. (duckweed fruit) P	4	21	1	15	1	
Juncus sp. (rush seed) MPd	++	+++	++	+	++	
Eleocharis subg. *Palustres* (spike-rush nutlet) MPd					4	
Carex sp. (trigonous sedge nutlet) MPd				1	29	2
Carex sp. (lenticular sedge nutlet) MPd	12	25	1	2	3	
Glyceria sp. (sweet-grass caryopsis) P					6	
Poaceae (small seeded grass caryopsis) CDG				10	8	1
Sparganium erectum L. (branched bur-reed fruit) PM					1	
Characeae (stonewort algae)	++	++				
Cladoceran ephyppia (water-flea eggcases eg *Daphnia*)				++	++	+++
Total remains:	396 (1584)	>699	60	>902	319	271

		(>5592)		(>7216)		
Sample size	1kg	1kg	1kg	1kg	1kg	1kg
% of flot sorted	25%	12.5%	100%	12.5%	100%	100%

KEY :
All remains are waterlogged unless in { } brackets = charred
Recorded in bulk sample, not quantified : + = occasional ; ++ = several ; +++ = frequent;
NFI = not further identified ; f = fragment of seed; i = immature seed
Feature Types : RD = ring ditch; RDT = ring ditch terminus; RD1 = ring ditch primary fill; RD2 = ring ditch secondary fill; W = well pit;
Habitat Preferences: A = arable; B = river banks etc.; C = cultivated; D = disturbed/wasteground; E = heaths; F = fens; G = grassland; H = hedgerows; M = marsh/bog; P = ponds, rivers, ditches; S = scrub; W = woods; Y = waysides
Soil preferences: a = acidic; c = calcareous; d =dry; n = nutrient-rich; o = open; s = sandy; w = wet/damp
Sum of items - Total number of remains counted (number of items in 1kg sample, estimated if <100% sorted)

Table 34.6: The charred and mineralised plant remains from the SG site

Sample Context	6330 496006	6314 49405	6316 500031	6331 504013	6312 498018	6313 498019	6317 498021	6318 505008
phase	Neo?	IA	LIRB	LIRB	S-N?	S-N?	S-N?	S-N?
Taxa Feature type	T496001	P494014	ED499020	P504011	P498020			PH
Cereals :								
Triticum aestivum-type (bread-type free threshing wheat grain)		33	34		1	1		
Triticum dicoccum/spelta (emmer/spelt wheat grain)				6	4			
Triticum sp. (wheat grain NFI)							1	
Hordeum sp. (indeterminate barley grain)		4		4				
Secale cereale L. (rye grain)		cf.4						
Secale/Triticum sp. (rye/wheat grain)		8						
Avena sp. (wild/cultivated oat grain)		2						
Avena/Bromus sp. (oat/chess grain)		12						
Indeterminate cereals	2	94	107	30	12		2	
Chaff :								
Triticum sp. (free-threshing wheat rachis frag.)	1	2	1					
Triticum dicoccum / spelta (emmer / spelt glume base)					1			
Triticum dicoccum / spelta (emmer/spelt spikelet fork)				2				
Cereal bran fragments & concretions with bran						[+]	[+++]	
Concretions with straw & bran							[+]	
Straw/rush/sedge stem fragments							[++]	
Weeds :								
Ranunculus repens/acris/bulbosus (buttercup achene) DG			2		1	2		
Papaver somniferum (opium poppy seed) D*								1
Papaver sp. (poppy seed) CD		1						
Urtica dioica L. (stinging nettle achene) CDn							1	
Corylus avellana L. (hazel nut shell frag.) HSW*		7	5	1	1			4
Fallopia convolvulus (L.) A.Love (black-bindweed achene) AD			1	1				
Rumex sp. (dock achene) CDG		2	6		2		2	
Rubus sect. *Glandulosus* (bramble seed testa) HSW*						{2}	{3}	
Rubus sp. (bramble/raspberry embryo) HSW*							[1]	
Malus/Pyrus sp. (apple/pear embryo) HSW*							[3+2fg]	
Prunus spinosa L. (sloe fruit & stone frag.) HSW*		cf. 1						
Vicia/Lathyrus sp. (<=2mm, small seeded weed vetch/tare) CDG		1			1			
Vicia/Lathyrus sp. (2-3mm, small seeded weed vetch/tare) CDG		11						

Vicia/Lathyrus sp. (3-4mm, small seeded weed vetch/tare) CDG		4						
Vicia faba var *minor* L. (Celtic bean) *		2						
Vicia sativa ssp *sativa* (cultivated vetch seed) *		cf. 10						
Pisum sativum L. (whole pea) *		cf.2						
Pisum sativum L. (pea hilum & testa fragment) *							[1]	
Legume (pea/bean) testa frags							[24]	
Legume testa & cereal bran fragments concreted together							[3]	
Vicia/Pisum sp. (large legume frag)		10						
Trifolium/Lotus/Medicago sp. (clover/trefoil/medick) DG					1			
Linum usitatissimum L. (cultivated flax seed) *	5+7fg				1	1+1fg	cf.1fg	744
Umbellifer NFI		1						
Odontites vernus/Euphrasia sp. (red bartsia/eyebright) ADGY					1			
Galium aparine L. (cleavers nutlet) CDH		4	2		1			
Anthemis cotula L. (stinking chamomile achene) ADhw							1	1
Lapsana communis L. (nipplewort achene) CDH							1	
Asteraceae embryo							[1]	
Eleocharis subg. *Palustres* (spike-rush nutlet) MPd		1						
Carex sp. (trigonous sedge nutlet) MPw			1			1	1	1
Carex sp. (lenticular sedge nutlet) MPw			4				1	
Bromus sect. *Bromus* (chess caryopsis) ADG		1					18	
Poaceae various (small seeded grass caryopsis) CDG		1					5	1
Mineralised nodule							[1]	
Millipede segments							[5]	
Total charred remains:	**15**	**218**	**163**	**44**	**27**	**9**	**34[44]**	**871**
Sample size (litres) :	**38**	**40**	**20**	**40**	**40**	**33**	**43**	**10**
Fragments per litre:	**0.4**	**5.5**	**8.2**	**1.1**	**0.7**	**0.3**	**0.8[1]**	**87.1**

KEY
All remains charred apart from { } = uncharred, possibly partly mineralised ; [ ] = mineralised
+ = present ; ++ = several ; +++ = frequent ; ++++ = numerous
Feature types : ED = enclosure ditch; P = pit; PH = posthole; T = tree throw ; fg = fragment
Habitat Preferences : A = arable; C = cultivated; D = distubed/waste; E = heath; G = grassland; H = hedgerow; M = marsh/bog; R = rivers/ditches/ponds; S = scrub; W = woods; Y = waysides/hedgerows; a = acidic soils; c = calcareous soils; d = dry soils; n = nutrient-rich soils; o = open ground; w = wet/damp soils; * = plant of economic value; cf. = uncertain ID

Table 34.7: Comparisons between the IA/ERB and later Romano-British samples at Stansted

Sites	LTCP and M11	M11 and LTCP	MTCP and LTCP and LBR	MTCP
Period	LIA/ERB	ERB	C2nd-C3rd	LRB
Number of samples	3	4	4	11
Assemblage types	gss	ggss	gsss	gggsssssccc
Average frags per litre (concentrated remains counted as 50fpl)	39.5	25.7	27.1	20.4
Barley (no. samples present/total samples)	3/3	3/4	4/4	2/11
Bread-type wheat + cf. bread wheat (no. samples present/total samples)	0/3	2/4	3/4	8/11
Emmer + cf. emmer (no. samples glume bases present/total samples)	2/3	0/4	3/4	3/11
peas and cf. pea (seed number)	0	0	6	2
hazelnut shell (samples present/total samples) + some reasonable quantities present	0.33+	0.5+	0.75+	0.18
Sheep's sorrel + heath grass - acidic soil indicators (seeds per sample)	1	2	8	+
Small-seeded legumes eg clover, vetch, tare (seeds per sample)	13	14	47	+
Wet ground taxa (spike-rush, sedges, blinks) (seeds per sample)	1	9	6	1
Chess (seeds per sample)	18	17	45	1
docks (seeds per sample)	11	11	76	10
Stinking chamomile – damp, clay soils (seed number)	0	0	3	7

Assemblage types: g = high grain, probably charred as processed grain deposit; s = high grain and chaff, probably charred spikelets; c= high chaff, probably spikelet processing waste

Table 34.8: Comparisons between the Stansted and A120 sites during the IA and RB periods

No. of samples with:	BAALR	BAACP	Dune	BAAMP	Strood	Rayne	BAACP	BAAMP	LBR	BAAMP	Strood	Rayne
	LIA/ERB	LIA/ERB	EIA-ERB	ERB	ERB	E/MRB	C2-C3	C2-C3	C2-C3	LRB	M-LRB	RB+LRB
Cereal types	SEBo	SeBof	sebo	Sf	Se	Se	SeboF	Sebo	Seborf	SeboR	Sebf	Sebf
Cereal processing waste					3	3				3	11	4
Grain-dominated assemblages	1	2	2					1		3		
Spikelets probably represented	1	2	1	1			3			5	1	
sprouted grain or detached sprouts present					1	3	3		1	6	12	4
Total no. of samples	2	4	10	1	6	4	3	1	1	11	29	4

Cereals: s=spelt; e=emmer; b=barley; o=oats; r=rye; f=free-threshing, bread-type wheat;

lower case=present; UPPER CASE=frequent; BOLD =abundant : numbers given are number of samples where present

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